STATE OF IOWA

BEFORE THE IOWA UTILITIES BOARD

IN RE: **INTERSTATE POWER AND LIGHT COMPANY**	**DOCKET NO: SPU-2018-0007**

INTERVENORS' POST-HEARING BRIEF (PUBLIC)

TABLE OF CONTENTS

BRIEF

I. Statement of the Case

The Intervenors are Jonathan Lipman AIA & Associates, Inc., an architectural Firm, and Kathy J. Matara, both of Fairfield, Iowa. They have intervened in opposition of the smart meter (AMI) program and tariff proposed by Interstate Power & Light Company ("IPL"). They oppose (a) smart meter installations, which they and their witnesses consider to pose unacceptable health and safety risks, and unacceptable costs to consumers, and if the smart meter program goes forward, they oppose (b) the digital meter only opt out elections proposed by IPL (rather than analog meters as an opt out choice) since Intervenors and their witnesses consider digital meters to also pose health risks from voltage transients or conducted emissions, sometimes called "dirty electricity," (c) the various eligibility criteria to be able to opt out of a smart meter and the criteria to continue to have a meter other than a smart meter, and (d) the costs to opt out of the smart meter program. Intervenors request the rulings from the Iowa Utilities Board (the "Board") set forth in Section X of this Brief.

II. Overview

A. <u>The Issues are Distressing to Iowans</u>

The issues in the Docket are controversial and highly distressing to many Iowans. It is an understatement to say that those who have complained in the docket feel strongly about the issues.

- Amber Dalton from Dexter (Intervenors' Ex. 36) said she and her husband "have EMF sensitivities and the installer tried to state that that doesn't matter when the meter isn't touching your house." After the installer would not stop his installation, Amber called IPL. She says she was told by "Keisha" at IPL that "once it [the meter] was pulled they are not able to

put it back." She says "if there is a list of people who want them [smart meters] to be removed, they should not be forced to keep them against their will."

- Ralph Harmon from Boone (Intervenors' Ex. 37) says he was placed on the opt out list after an installer came to his home "without previous notification." Among other things, he asks that the IUB "not allow those who opt out for their own safety to be penalized for something they did not ask for in the first place."

- Mindy Slippy from Cedar Rapids says "the smart meter implementation has stirred great concern. More than Fairfield (Intervenors' Ex. 38, p. 1)." She wants "[a] buyer of a home that already has a smart meter to be able to opt out" as well as a "new renter." (p.5). She says she is concerned for herself but also for "trusting customers who did not opt in the beginning, since the Company assured safety." (Ex. 38, p. 4).

The Docket objections and comments show that Iowans get their information from many sources and come from many cities. Fairfield has the largest number of people opposed to smart meters; however, Ms. Slippy is right that this is more than a Fairfield issue.

B. <u>The Opposition to Smart Meters will Increase</u>

The future will likely bring more, not fewer, concerns about the costs, the opt out restrictions, and health and safety issues as there is new publicity on the issues. It is common knowledge that Marriott Hotels recently told us that information from up to 500 million customers had gotten into hackers' hands. And Pacific Gas & Electric hackings obtained the data of many more millions of consumers. People are learning that a smart grid and its meters can be hacked and are not happy about it. Chester Sullivan of Marion (objection filed December 7, 2018) said:

> We allowed Alliant Energy to replace our analog meter with a smart meter because of the fee Alliant would charge us to keep the analog meter. . . .The information transmitted by the smart meter would allow the criminal-minded to deduce extended periods of inactivity at a residence. Who is responsible when this information is used to target homes for break-ins? We want to go back to the analog meter to ensure some basic privacy. Given the misinformation from Alliant about the smart meters, it seems unethical to charge customers who, once educated, now want the safety and security of an analog.

New research is continually emerging causing many scientists to reevaluate their position on the dangers of RF radiation. At the hearing, Dr. Havas described the final release of the federal government's National Toxicology Program (NTP) study on November 1, 2018 (Transcript, p. 545, line 23 to 546 line 24), which the American Cancer Society calls a "paradigm shift in our understanding of radiation and cancer risk" (Intervenors' Exhibit 15, p.1). And in December, 2018, Vol. 2 of the *Lancet*, one of the world's top medical journals, published an article on the mounting evidence of harm from electromagnetic radiation.

C. Smart Meter Growth is Fueled by Economics

Why are so many utilities on the smart meter bandwagon? A major motivating force for IPL is the economics of the industry. Through the smart meter program, IPL gets rid of operating expenses (e.g., paying meter readers), those being expenses on which there is a relatively low profit margin in a cost-based recovery system, and the utility substitutes capital expenses (e.g., meters, towers, and other equipment) on which the IPL customers, through their billing rates, will likely pay IPL more than a 7% rate of return every year for many years on the undepreciated cost of IPL's smart meter capital investment. See Section VIII of this Brief.

D. The Precautionary Principle Should be Applied

Intervenors' contend that the precautionary principle should guide decision making in the case. *Wikipedia* defines the precautionary principle, sometimes referred to as a safety first principle (https://en.wikipedia.org/wiki/Precautionary_principle), as follows:

> The principle is used by policy makers to justify discretionary decisions in situations where there is the possibility of harm from making a certain decision (e.g. taking a particular course of action) when extensive scientific knowledge on the matter is lacking. The principle implies that there is a social responsibility to protect the public from exposure to harm, when scientific investigation has found

> a plausible risk. These protections can be relaxed only if further scientific findings emerge that provide sound evidence that no harm will result.

The precautionary principle is widely respected for its relevance in evaluating health issues. Walton Rebuttal Exhibit C is a letter signed by 53 scientists opposed to the proliferation of smart meter radiation. After summarizing the research, at page 6 they state:

> This is why so many scientists and medical experts urgently recommend that measures following the Precautionary Principle be applied immediately — such as using wired meters — to reduce biologically inappropriate microwave exposure. We are not advocating the abolishment of RF technologies, only the use of common sense and the development and implementation of best practices in using these technologies in order to reduce exposure and risk of health hazards.

E. IPL has the Burden of Proof and Reasonableness is the Standard

IPL has the burden of proof to demonstrate its meters are safe, free of unacceptable hacking and privacy risks, and that the non-standard meter eligibility criteria and conditions for retention of these meters are reasonable. IPL states in its Response to Intervenors Matara and Lipman's Request for Board to Accept Further Testimony, filed October 24, 2018, p. 7 "that IPL gets the last opportunity for limited rebuttal is not unreasonable where the proceeding is limited in scope and IPL has the burden of proof."

III. At Least Some of the IPL Meters Do Not Comply with FCC Safety Requirements

A. IPL has Not Met its Burden to Show that the Transmitting Module in the Sensus Stratus Meter and Other Meters are FCC Compliant due to the 20 cm Rule

1. Basic Information on RF radiation Limits.

- "[The FCC] guidelines are frequency specific [meaning that they vary depending on the frequency of the radiating source] and the FCC guidelines are 600 microW/cm2 at 900 MHz and 1000 microW/cm2 at 2.4 GHz." (Havas Rebuttal Testimony, p. 17 note 11 and Valberg Direct Testimony, p. 9 note 9).

- This guideline is the FCC limit that is permissible for a radiating source *at any*

distance (sometimes called the MPE or maximum permissible exposure), and the power of this RF radiation is often referred to as the "power density" (see, e.g., IPL Exhibit 215, p. 14).

- The power density will be lower the farther a person is from the antenna or radiating source (Intervenors Hearing Exhibit 35; see charts at pp.5-6). The power density for the Sensus meters at 20 cm distance (7.8 inches) from the meter is 254 milliWatts/cm2 which is the same as 254 microWatts/cm2, if we use the same units (Havas Rebuttal Testimony, p. 27 lines 4-8; Valberg Direct Testimony, p. 9 note 9; and IPL Exhibit 215 p, 14 (table, last two columns).[1]

- Therefore, ignoring the time averaging portion of the FCC guideline (discussed later), the Sensus radiation at a distance of 20 cm from the antenna is 42% of the FCC guideline, that being the fraction 254 microwatts per centimeter squared (Sensus meter at 20 cm distance) divided by 600 microwatts per centimeter squared (FCC limit at any distance) (Havas Rebuttal Testimony, p 27 lines 4-8).

- None of the foregoing should be in dispute, but what is in dispute regarding the power density or power of the RF radiation is (a) whether time-averaging (averaging the time that a meter is pulses over a thirty minute period to determine the maximum permissible exposure) *should apply* to measurements of the RF radiation generally (Drs. Havas and Valberg disagree, and the FCC says time-averaging does apply to distances from the meter greater than 20 cm, and (b) whether the FCC requires a *minimum* separation distance of 20 cm from the

[1] Dr. Valberg repeatedly characterizes the Sensus meters as having a power density of 254 microwatts per centimeter squared at *six inches* from the meter, but that is the power density of the Sensus meters at 20 cm, which is 7.8 inches (see, for example, Valberg Direct Testimony, p. 9 footnote 9 and Valberg Rebuttal Testimony, p. 11 line 11). **Even slight differences in distance matter very close to the antenna as will be discussed.** He also tells us the meters transmit *at most* for 0.085 seconds (Valberg Direct Testimony, p.9 line 7), when at times they transmit for 1.2 seconds (Matara Rebuttal Ex. C, p. 153 bottom paragraph).

antenna for all persons, as stated in the grant authorization, or whether the 20 cm rule is subject to maximum permissible exposure (MPZE) and time-averaging concepts.

2. The Antenna in Sensus Meters is only One Inch from the Public.

The Sensus Stratus meter has an FCC ID # of SDBIDTB004 (see IPL Hearing Exhibit 214, p.1; the ID #s are at bottom of page). The Sensus Stratus meter is the one subpoenaed for the hearing (IPL's Objection and Motion to Quash Subpoena to IPL, Attachment A, p.2, filed October 26, 2018). Mr. Reed testified that the antenna in the meter was one inch from the side and one inch from the top of the glass or plastic piece, which is the outside of the meter (Transcript, p.323 line 20 to p.326 line 1). In other words, a person touching the meter would be one inch away from the antenna. The location of the antenna at that close distance from the general public violates the FCC requirement in approving the transmitting module, which is that the transmitter "must be installed to provide a separation distance of at least 20 cm from all persons" (Intervenors Hearing Exhibit 52, p. 7).

William Bathgate is an experienced electrical engineer with 40 years' experience. His work has included obtaining FCC product compliance certifications, and he has held major positions with IBM, Emerson Electric Corporation (Global Engineering Program Manager 2009-2015), and Hewlett Packard Corporation (Managing Director, Computer Systems Engineering, 1995-2009). He has a long term contract to perform services for the Department of Defense and holds a Department of Defense Top Secret security clearance (Bathgate Rebuttal Testimony, p. 2 lines 13-22 and Bathgate Rebuttal Exhibit A). He has personally prepared four applications to the FCC for equipment authorization and participated in another seven applications (Transcript, p. 836 lines 2-5).

At the hearing Mr. Bathgate explained the process of obtaining FCC approval for equipment. An application is prepared and submitted to the FCC, and the FCC will review all the information (Transcript, p. 836 line 6 to line 23). The FCC will then approve the application, deny it, or approve

it with conditions imposed (Transcript p. 836 line15 to p. 837 line 11). IPL's Exhibit 215 is an "application [to the FCC] for approval of a module," which can go in different meters, and "it has an antenna" (Transcript, p. 838 line 20 to 839 line 5). IPL Exhibit 215, pp. 1-2 is the beginning of the application documents for the stand alone module that is part of the Sensus Stratus meter. Intervenors' Exhibit 52 is the FCC Grant of Equipment Authorization dated April 8, 2013 (see Intervenors Exhibit 52, top of p.7) for the Sensus module with the antenna with the FCC ID SDBIDTB004 (Exhibit 52, p. 1), the meter subpoenaed and produced at the hearing.

The FCC Grant of Equipment Authorization begins at the bottom of p.6 of Exhibit 52. At the bottom of page 7 on Exhibit 52 are the installation conditions set by the FCC for the installation of the modular device. There, the FCC grant states:

> Modular Approval. Power listed is conducted. This Modular Approval is limited to installation for mobile and fixed applications only. This grant is valid only when the device is installed by the grantee or contractors employed by the grantee who are instructed to ensure that the end-user has no manual instructions to remove or install the device. *The transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter.* Installers and end-users must be provided with operation conditions for satisfying RF exposure compliance. (Italics added).

This FCC installation condition in granting approval of the meter is *not* equivocal or qualified in any way. It provides that the transmitter *must* be installed to provide a *separation distance of at least 20 cm from all persons.* As Mr. Bathgate testified, it applies to all persons inside and outside the house (Transcript, p. 844 line 21 p. 845 line 2). The fact that it must be installed to maintain at least the 20 cm distance from all persons is a *mandate* with no exception stated. For example, there is no exception for modules that transmit infrequently as opposed to continuously; there is no provision to allow "time averaging" (averaging the power density over

30 minutes) in computing maximum permissible exposures to reduce the 20 cm *minimum* separation distance (7.8 inches) to one or two inches.

It should be noted that the same minimum separation distance is set forth in the FCC Grant Authorization for the Sensus iCon transmitter, which is also being used by IPL in Iowa (Intervenors' Exhibit 46, p. 8 is the Grant Authorization and IPL's Exhibit 214 shows the Sensus iCon and Sensus Stratus as meters deployed by IPL). We don't know if the Sensus iCon meter also has its antenna one-inch from the glass or plastic covering, but if so any ruling of the Board should apply it to any other meters that do not comply with the 20 cm rule.

3. A Sensus Document Obtained in Discovery Recognizes the 20 cm Rule is a Mandate

Mr. Reed stated that the information in Matara Rebuttal Exhibit C Public, at pages 142-163, consisting of MPE calculations or maximum permissible exposure calculations,[2] is not confidential and he was emphatic that it is not submitted to the FCC, but is sent to people who request it (Transcript, p. 391 line 23 to 392. Line 24). The document recognizes the 20 cm rule is a mandate, but Sensus ignores that it is a *minimum* separation distance mandate and tries to show compliance at less than the minimum distance through MPE equations or calculations that are not applicable.

Pages 142 to 151 of the MPE calculations in Matara Rebuttal Exhibit C Public relate to electric meters and pages 151 to 163 relate to gas meters. At Exhibit C, p. 144, under the heading "**MPE Calculations for General Population-Uncontrolled Exposures**," the Sensus document states (third paragraph from the bottom) that:

> Solving for R ["distance to center of radiation of the antenna" as stated in the formula on the same page] would give a separation distance of 13 centimeters to meet the MPE limit of 0.6mW/cm[squared] if the meter was in *continuous* operation, which is not the case. <u>The 13 cm separation is well within the 20 cm</u>

[2] Matara Rebuttal Exhibit C is in a public and confidential form.

> limit that the FCC mandates for mobile operation as stated on the grant of equipment authorization for the transmitter. (Underlining added).

What is notable here is, first, that Sensus recognizes that the grant authorization has a "20 cm limit that the FCC mandates." Sensus states however that in using its MPE calculations or equations "the 13 cm [applicable to the Sensus meter based on MPE calculations] is 'well within the 20 cm limit that the FCC mandates." This is just obfuscation as it applies to the meter at hand even if the MPE calculations were to apply and they don't (this is further explained in the next section). No one getting this document would understand what we know, which is that that the FCC states that 20 cm is a minimum distance that the antenna must be from the public, meaning the public should not be able to get closer than 20 cm. But the Sensus conclusion is that a 13 cm separation distance is "well within the 20 cm limit" and the Sensus meter is in full compliance. It is just the opposite. If you are 13 centimeters away from the transmitter, you are too close and certainly not "well within the 20 centimeter limit."

At Exhibit C, page 146, Sensus uses more equations (last equation on p. 146) to give a separation distance of R (distance from the antenna) equaling 2.14 cm, and on p. 147 it states that the antenna is separated by 2.2 cm (about one inch) from the glass so that (last sentence on p. 147) it concludes that the "MPE limits for general population/uncontrolled exposure would be met as the glass provides enough separation between the meter and the antenna and the general population." In summary, Sensus again uses inapplicable MPE calculations in an effort to show, for those who ask, that its Sensus Stratus meter satisfies the distance requirement by a hair. It is seeking to show compliance because the glass or plastic would keep the public 2.2 centimeters away, and its MPE calculations would result in a violation of FCC rules (which means unsafe conditions) at 2.14 centimeters away. And of course, using the Sensus analysis, you also have to

conclude that the FCC grant authorization mandating a separation distance of *at least* 20 centimeters doesn't mean what it says and, instead means a separation distance that is not a minimum distance but one that can be reduced depending on MPE equations.

The remaining pages of Exhibit C, pp. 151-163 have a similar analysis for gas meters but a more clear statement of the 20 cm minimum separation mandate.

What is wrong with the Sensus MPE analysis?

First, even if the MPE calculations apply, there isn't much of a safety margin if your calculations show that you are in the clear by .06 centimeters (a 2.2 inch glass separation when Sensus claims that all that is required for safety is 2.14 inches). This is not exactly application of the precautionary principle, but in all events the MPE calculations simply don't apply to the minimum separation distance or it wouldn't be a minimum of "at least a 20 cm separation distance."

There is no indication whatsoever from the FCC grant authorization that you can use MPE analyses to reduce the minimum separation distance below 20 centimeters. As stated above, Mr. Reed volunteered quite emphatically that this document is not submitted to the FCC (Transcript, p. 391 line 7 to p. 392 line 13 and especially lines 11-13 at p. 392), and certainly if it or any MPE analysis was relevant to the grant authorization it would have been submitted to the FCC or the FCC would have asked for it. Either way, if the FCC has knowledge of the MPE calculations or if it has no knowledge of it because it is not relevant, the FCC grant authorization required the 20 cm minimum separation distance. And it is probably with good reason that Sensus does not submit its MPE calculations to the FCC. If the FCC really means that 20 cm is a minimum distance, it would not be very pleased with a manufacturer's documents promoting how 13 centimeters or 2.14 centimeters would satisfy a 20 cm FCC rule.

We can't assume that the FCC doesn't specify and receive all the information it needs to issue its grant of equipment authorization. We can't assume the FCC doesn't know all the CFR and other regulations that are applicable. It doesn't get an MPE analysis because it is not relevant to a decision on the minimum separation distance.

This is clearly a safety issue, and there should not be exceptions granted by the Board to the FCC rule. With 700,000 or so gas and electric meters, some people will be painting, or fixing the siding, or cleaning their windows, or gardening and will come within 20 centimeters for some length of time, and with the potential for banks of meters on apartment buildings and condos, and the potential that some of the meters will be transmitting at least hundreds if not thousands of times per day or week (see the Wisconsin experience in IPL Hearing Exhibit 217 even after 10 years), some members of the public will be within that separation distance on an unknown number of occasions. How many customers we don't know (IPL's Exhibit 217 only tells us how many meters are radiating over 3,000 times per week), and while the Reed and

Valberg testimony states that the meters only radiate for 85 milliseconds or .085 seconds a day (see Reed Rebuttal Testimony p. 5 lines 19-23 and Valberg Direct Testimony, p. 9 footnote 9), the Sensus MPE calculations reveal that using "boost mode" when commissioning the meters at the outset (which lasts for at least two months according to IPL Exhibit 217), the transmitter is on air for 1.2 seconds at a time and the gas meter can transmit once every 6 seconds (Matara Rebuttal Public Exhibit C, p. 156 last paragraph). Members of the public, even a limited number, shouldn't be harmed for the sake of Sensus' and IPL's economics.

4. The Minimum Separation Distance is Due to Uncertainties in Power Density of the Antenna at Close Distances (what is called the Near-Field)[3]

Valberg Direct Schedule D is the *IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz*. Dr. Valberg attached Schedule D to his testimony in full because of its importance, and he refers to it as an independent group producing a "blue-ribbon" report "comprehensively examining RF safety." (Valberg Direct Testimony, p. 11 line 11 to p. 12 line 9). This safety standard tells us that there are "non-uniform" fields such as what is known as the "near-field" (very close to a radiating source) where there exists a "highly localized area of relatively intense RF energy", and where **the MPE assumptions do not apply**, and exposures can be "in excess of the MPE."

Valberg Direct Schedule D. p. 152, the IEEE RF Safety Standard, states:

[3] The **Near-Field region** is defined at Valberg Direct Schedule D, p. 20 as: A region, generally in proximity to an antenna or other radiating structure, in which the electric and magnetic fields do not have a substantially plane-wave character, and vary considerably from point to point. The near-field region is further subdivided into the reactive near-field region, which is closest to the radiating structure and contains most or nearly all of the stored energy, and the radiating near-field region where the radiation field predominates over the reactive field, but lacks substantial plane-wave character and is complicated in structure.

NOTE—For most antennas, the outer boundary of the reactive near-field region is commonly taken to exist at a distance of [$X/2\pi$] from the antenna surface, where [X]is the wavelength. The radiating near field region extends out to the far field region.

D.1.1.1 Practical constraints

> *Exposure to non-uniform fields may be characterized as exposure to fields over a specified volume of space, in which there exists a highly localized area of relatively intense RF energy. Non-uniform fields may be due to* 1) the superposition of RF fields caused by reflections that result in localized standing waves; 2) narrow beams produced by highly directional antennas or radiating structures; or *3) the near field region of a radiating structure.* In all cases, the fields may be characterized by very rapid changes in field strength with distance. Localized exposures result from exposure to non-uniform fields leading to non-uniform SAR distributions with high spatial peak SAR values (non-uniform energy absorption). Localized exposures can also result from the exposure to a non-uniform field, with the exposure dependent on the size and orientation of the person in the field. *Non-uniform fields can result in localized exposures in excess of the MPE.*
>
> *In the reactive near-field region, there is no simple relationship between the E and H fields (the impedance (E/H) will differ from 377 ohms). The linear decrease in field strength with distance and the decrease in power density with distance squared that is characteristic of the far field do not apply in the near field region.* (Italics added).

The IEEE safety standard tells us non-uniform fields like the near-field are fields where *there exists a highly localized area of relatively intense energy* (top of quote above), which *can result in localized exposures in excess of the MPE* (bottom of first paragraph of quote above), meaning the exposure can be higher than the maximum permissible. And below it says that the reactive near-field (closest to the antenna) poses a special concern. See Valberg Schedule D, p. 140, where it states that:

> A special concern is exposures taking place in the reactive near field of a source which is typically taken to be a distance equivalent to $\lambda/2\pi$, or approximately one-sixth of the incident field wavelength (CENELEC [B25]).

In English, the *reactive* near-field region is 5.31 centimeters (2.09 inches) from the antenna for frequencies at 900 Mhz (see the table at Valberg Schedule D, p. 140).

To summarize, very close to a radiating structure, and especially in the reactive near-field within 5.31 centimeters, there is *relatively intense RF energy* and the MPE calculations that IPL and Sensus would like to use with their time averaging principles do not apply. In the far field

only, using normal MPE equations (far field calculations), if you were 2.2 cms away, as in the Sensus example above, the MPE calculations might say a person is safely away from the antenna. But this doesn't apply to our situation. In the near-field, the person is not at a safe minimum distance and especially not if the person is in the reactive near-field where there poses a "special concern." It makes sense that the FCC would want a *minimum* separation distance to avoid the uncertainties of the near-field.

The same section of the IEEE safety standards, Valberg Schedule D, p. 153, also states:

> The reactive near field contains stored RF energy rather than radiated RF energy and the fields often vary rapidly with distance. Issues that should be considered are:
>
> a) **MPEs:** *The MPEs are based on the assumption of uniform exposure* and are expressed in terms of field strengths or plane-wave equivalent power density of the incident field, i.e., the electric and magnetic field strengths that correspond to a plane-wave field with the same values and uniformly distributed in planes transverse to the direction of propagation.

Again, the MPEs used by Sensus *are based on the assumption of uniform exposure,* which doesn't apply in the near-field.

Wikipedia's definition of the characteristics of the near-field can be found at https://en.wikipedia.org/wiki/Near_and_far_field#frb-inline. About two-thirds of the way through that general description of the near-field it states:

> The reactive component of the near field can give ambiguous or undetermined results when attempting measurements in this region. In other regions, the power density is inversely proportional to the square of the distance from the antenna. In the vicinity very close to the antenna, however, the energy level can rise dramatically with only a small decrease in distance toward the antenna. *This energy can adversely affect both humans and measurement equipment because of the high powers involved.* (Italics added).

In other words, the RF radiation rises dramatically as we go from 20 cm to one inch from the antenna.

5. IPL's Position at the Hearing was to Rely on the FCC Application rather than the FCC Grant Authorization

The statements in the Sensus manual suggesting that MPEs may shorten the 20 cm minimum separation distance are self-serving. As a result, IPL introduced Exhibit 215 at the hearing to show independent certification of FCC compliance in a document submitted to the FCC. Exhibit 215 was not an exhibit accompanying any of IPL's Direct or Rebuttal Testimony. At the hearing, IPL moved this new exhibit into evidence, with counsel stating/testifying that:

> It is--these are FCC-submitted documents and they show, as the witness has testified here as an offer of proof, compliance with the FCC rules. This, again, is an issue that is front and center for this case. They're government documents and I believe they should be received.

(Transcript, p. 367 lines 8-15).

But of course, the documents that are IPL Exhibit 215 don't show compliance with FCC rules (an application to the FCC is not the FCC approval). While it may be unintentional, Exhibit 215 is misleading, and it is surprising that it would be submitted to the Board and the grant authorization not submitted. In all events, the importance of Exhibit 215 is greatly overstated in light of the Intervenors Exhibit 52, the actual FCC authorization.[4]

Mr. Reed stated that the "Certification Exhibit" that is at pages 13-14 "shows that the device complies with the maximum permissible exposure requirements to provide adequate separation between the device, any radiation structure, and the general population" (Transcript, p.370, line 25 to p. 371 line 4). Well, it may comply with the MPEs in some sense, but the MPEs don't apply to the near-field, and the device (the transmitting module) wasn't installed in compliance with the FCC grant authorization.

[4] Intervenors' Exhibit 52, the FCC authorization, is "front and center" in this case; IPL Exhibit 215, the application to the FCC, is in the second row even farther from the front.

Advanced Compliance Solutions ("ACS"), the agent for Sensus (IPL Exhibit 214, pp. 1-2), even told the FCC in the Certification Exhibit (IPL Exhibit 215, p. 14 bottom of page) that:

> **RF Exposure**
>
> In accordance with FCC requirements of human exposure to radio frequency fields, the radiating element shall be installed such that a minimum separation distance of 20 centimeters *will be maintained.*

That is the rule, but we know now that it wasn't installed to maintain that minimum separation distance; but presumably on the basis of what ACS assumed, that the radiating element shall be installed so the 20 cm distance *will be maintained*, ACS concluded (see the "Conclusion" at the bottom of page Exhibit 215, p. 14) that the modular "complies with the MPE requirements [maximum permissible exposure requirements] by providing adequate separation between the device, any radiating structure, and the general population." Whether or not the device complies with *inapplicable* MPE standards, the device doesn't comply with the minimum separation standards.

Similarly, the label that Mr. Callisto had Mr. Reed read to the Board states that "This device complies with Part 15 of the FCC rules" (Transcript, p. 364 lines 1-7). But while the device may comply in isolation, it does not affect the FCC's installation conditions regarding the separation distance. Mr. Reed's recitation of the label may have had the effect of misdirecting the Board, just as did his emphasis on the FCC application. In all events, the FCC was aware of the label to be used since it was part of the application exhibits (see Intervenors' Exhibit 52, p. 4 where the "Label Information" to be used is an exhibit to the FCC application; or go on the website shown at the bottom of page 4, and click on the Label Information). In other words, the FCC approved the label by its grant of equipment authorization for the modular transmitter, but the transmitter still needed to be installed in a meter such that the minimum 20 cm distance is maintained. Mr. Bathgate agreed that "the FCC sticker [has] nothing to do with modifying the 20

centimeter rule."(Transcript, p. 846 line 16 to line 22), and "it doesn't relate to a safety requirement that people stay 20 centimeters away . . . .The FCC is aware that these labels are going to be put on the device . . . but they are still imposing a 20-centimeter rule"(Transcript, p. 847 lines 9-22).

The precautionary principle says better safe than sorry. No members of the public should be potentially harmed by meters that don't comply with FCC rules. While we can differ with the FCC if we believe their mandates are out of date and too high for public safety (as Intervenors do), we can't ignore the FCC safety mandates because we think they are overly protective. When questioned, Mr. Bauer agreed that it is IPL's "responsibility to ensure [it has] a safe meter" (Transcript p. 145 lines 4-7), and that his "definition of safety is whatever official authorities have established as safe" (Transcript, p. 145 line 23 to p. 146 line 1). As a minimum, IPL should have demanded that Sensus produce the grant authorization as a matter of IPL's due diligence, or if it did produce it to IPL, it should have been shared with the Board and the Intervenors who only discovered it after the November hearings.

B. <u>IPL Has Not Met its Burden to Show the Voltage Transients Emitted from its Meters are within FCC limits</u>

1. *IPL has not proved that the Centron Itron C1S digital meter complies with the FCC limits*

The Centron Itron C1S (the "Itron") meter is IPL's digital opt out meter if a customer does not want a smart meter (Transcript, p. 712 line 19 to p. 713 line 18). In his October 19, 2018 pre-filed testimony and in his testimony at the hearing on December 5, 2018, Mr. Bathgate testified to four tests for voltage transients conducted on the Itron meter, the first of which showed the meter to be FCC compliant (this is the report that Mr. Callisto had Mr. Bathgate read on cross-examination), but which Mr. Bathgate later determined to be an invalid test (as

described below) and not useful for purposes of his opinion (Bathgate Rebuttal Testimony, p.8 line 16 to p. 9 line1), and three tests, which showed the Itron meter was not FCC compliant. IPL has introduced no evidence to show its Itron meter is compliant with FCC rules other than Mr. Bathgate's testimony of the one invalid test.

The FCC limit on voltage transients is 250 microvolts RMS (root mean squared) (Bathgate Rebuttal Testimony, p. 4 line 16 to p. 5 line 9). After Mr. Bathgate's initial invalid test in early 2018, he tested the Itron meter by arrangement with IPL at IPL's offices, and it produced a reading of 707 microvolts (Bathgate Rebuttal Testimony, p. 5 lines 18-20). He used filters in that testing to reject inappropriate frequencies (Bathgate Rebuttal Testimony, p. 5 line 20 to p. 6 line 1).

He next tested the Itron meter at Ms. Matara's residence in Fairfield, which he said was a good home for measurement purposes. At Bathgate Rebuttal Testimony p. 6 line 18 to p. 7 line 3 he states:

> This home is a good baseline for measurement because the home is isolated in the county and more than a ½ mile from any other property. In addition this home is on its own power transformer and not shared with any other residence which could possibly affect any measurements. There is a power line that runs parallel to the road and about 100 feet away. This would also not affect the measurements. We did the test in the evening shortly after 9 PM. We were able to power down all branch circuits and conducted the test with an isolated branch circuit with only the measurement equipment connected and no other devices turned on.

The test measurements showed 318 microvolts, which is significantly above the 250 microvolt limit (Bathgate Rebuttal Testimony, p. 7 lines 4 to 6).

At the hearing, Mr. Callisto had Mr. Bathgate read his prior testimony in Pennsylvania about the Itron meter, which was testimony when Mr. Bathgate did not think the Itron meter had

significant dirty electricity.[5] However, subsequent to that test (and prior to his test at Ms. Matara's residence), Mr. Bathgate discovered that the Itron meter shared a transformer with other residences and Mr. Bathgate determined that initial test when he praised the Itron (and which Mr. Callisto focused on at the hearing) was in Mr. Bathgate's words, "invalid." In his October 19, 2018, pre-filed testimony, Mr. Bathgate states that

> earlier in 2018 I made an assertion that the C1S (Itron) meter did not have significant DE. *In a retest of this meter in the summer, it was determined that this initial test was invalid due to the later discovery that this test was influenced by a shared transformer with two other residences and was not isolated adequately from other residences to conduct a valid test measurement.* The retest of this meter in my possession at the time was performed in an isolated environment with no shared transformer showed results the same as found in the Matara residence. Therefore there is DE created by the C1S meter (Italics added)..

(Bathgate Rebuttal Testimony, p. 8 lines 16-22).

Since the Pennsylvania statement by Mr. Bathgate praising the Itron meter was based on an invalid test, which Mr. Bathgate pointed out in his pre-filed testimony, it does not nullify Mr. Bathgate's subsequent opinion in his pre-filed testimony on October 19, 2018, that the Itron meter itself produces DE and voltage transients that exceed FCC limits. Mr. Bathgate further elaborated on the invalid test when questioned at the hearing by Chairperson Huser. Please note that what made the Pennsylvania test invalid was the "shared transformer" as he stated in his

[5] At Transcript p. 892 line 24 to 893 line 10, in response to Mr. Callisto's question, Mr. Bathgate read his testimony in Pennsylvania, which was produced to IPL by Mr. Marcus in discovery. That testimony stated that:

> A. There is a safe digital meter alternative with the Itron C1S meter that has been widely deployed in North America and in my testing of that model unit there is no SMPS, and it instead uses a capacitive based power supply that does not exceed the 250 microvolt limits. There is also no radio transceivers in this Itron C1S unit. PECO should investigate this type of capacitive power supply design to be incorporated
> Q. Just finish that sentence at the top.
> A. in the meters they use or switch suppliers.

pre-filed testimony (see the pre-filed testimony quoted above). In explaining this invalid test to the Board, Mr. Bathgate stated the following about how the invalid test was conducted and the shared transformer (Transcript p. 897 line 6 to p. 898 line 3):

> I had done some testing back in the winter of 2018 [on the Itron meter] and it was at my own home which has an analog meter as the primary feed and I was comparing the analog meter versus the C1S meter and I didn't see an appreciable difference between the analog meter and the digital meter at that time.
>
> And then--let me explain. My house was under construction, it's stripped to the bone, there wasn't a single appliance or anything running. The place was empty. It was 20 below. I was freezing in the place. There's no heat. I did the test as quickly as I could to get the data.
>
> And then when the weather warmed up I happened to look up at the pole and noticed I'm sharing my transformer with two other neighbors which have smart meters. I went back and said, "Oh, I better rerun the test." I reran the test, just the analog meter by itself and then with the Itron C1S meter downstream from that, and I got more dirty electricity from the digital meter than the analog meter and I documented those results.

The fourth test Mr. Bathgate conducted on the Itron meter is also summarized in his response to Chairperson Huser. Mr. Bathgate described the comparison he did in Fairfield of an Itron meter with an analog meter, showing the "not insignificant" difference between an analog meter and the Itron meter in terms of the dirty electricity (Transcript, p. 898 line 4 to p. 899 line 2).

In summary that makes four tests of the Itron meter, the initial invalid test in Pennsylvania based on the shared transformer, followed by three tests that showed the Itron meter to be non-compliant, including the one at Ms. Matara's residence where no one shares the transformer. That test was conducted in the evening after isolating the Itron meter on its own circuit.

In IPL's Brief it will undoubtedly point to the invalid test and Mr. Bathgate's erroneous praise for the Itron caused by the test's invalidity, as well as Mr. Reed's testimony that other devices in the "pool" do not allow you to determine if the dirty electricity is coming from a particular meter. But if there is not much in the pool as in the case of the Itron test at the Matara

residence, Mr. Bathgate's opinion is that it is more likely than not that the Itron meter itself is the cause of the FCC non-compliance (Bathgate Rebuttal Testimony, p. 8 lines 12-15). Moreover, the best evidence, and really the only evidence, that would show compliance of the Itron meter with FCC limits would be a proper certification report for the meter, which IPL never supplied. IPL supplied its Exhibit 216 (which is problematic itself) as evidence that the Sensus Stratus meter complied with the FCC voltage transient limits, but did not supply any independent or even IPL report to indicate that the Itron meter complies, when such a test *would be required*. Mr. Reed explained that IPL Exhibit 216 shows compliance for the Sensus meter (Transcript, p.313 lines 10-22 and p. 78 line 23 to p. 379 line 3) not the Itron meter, and the test is required. IPL's questions and Mr. Reed's answers were:

> Q. Mr. Reed, you have before you what's been marked as IPL Exhibit 216. Do you recognize this?
> A. I do.
> Q. What is it?
> A. It is a test report for FCC Part 15 Subpart B, testing for our electric meter [the Sensus meter]. What it is—its purpose is for any digital device released into the market, you have to test that a digital device does not emit energy and bands that they don't want you to emit, energy, unintended radiation. They also require testing for conducted radiation on power lines that you're connected to.

Mr. Reed also stated (Transcript, p.314 lines 2-5):

> Any device that needs to be sold in the marketplace needs to have this testing done to show that it won't affect other--any electronic device needs this.

From the Intervenors' criticism of IPL Exhibit 216 (the voltage transient test on the Sensus meter), it is apparent that even a third party certification may not be good evidence of FCC compliance. And the failure of IPL to produce any such certification or other report of safety compliance for the Itron means IPL has not satisfied its burden of proof to show the Itron meter is safe and in compliance with FCC rules.

2. *IPL's Certification Report for its Sensus Stratus meter is Invalid and Does not Show that Meter is FCC compliant*

IPL Exhibit 216 was introduced to show that the Sensus Stratus meter complies with the required FCC limits on voltage transients. Exhibit 216 is not a certification by the FCC claim product certification [by] . . . any agency of the Federal Government"), but a certification of compliance by ACS a testing laboratory. At the hearing, Mr. Bathgate pointed out the flaws in Exhibit 216.

First, there was no documentation of what the attenuation is on the spectrum analyzer, which measured the voltage transients. If it is not set correctly, all the measurements would be incorrect (Transcript, p. 853 line 5 to p. 854 line 4).

Second, the measurements were stated to be "tested in its normal mode of operation as used in residential installations" (Exhibit 216, p. 23), but Mr. Bathgate testified that ACS couldn't make that statement based on the range of temperatures in Iowa and a meter to be installed outside the house (Transcript, p. 855 line 11 to p. 856 line 2).

Third, Exhibit 216, continuing on page 23, has tables showing line 1 and the neutral line were tested, but there is no neutral connection on the meter. Mr. Bathgate said, "Neutral means nothing. There is no neutral line on the back of this meter. It doesn't exist. . . . There is no neutral connection on any meter yet we're testing a neutral line . . . . Makes no sense" (Transcript, p. 856 lines 6-15). The test should have been done on lines 1 and 2 because either of those lines could be connected to the switching power supply (or other device creating dirty electricity), which is what creates the dirty electricity. If you only connect to line 1 and not line 2, then if what creates the dirty electricity is line 2's connection to the switching power supply, you will not get dirty electricity or non-compliant readings (Transcript, p. 856 line 21 to p. 858 line 6).

"[The switching power supply] is basically is a switching circuit and it can be done in several different ways, but basically what it is doing is taking AC high voltage and converting it to low voltage [which is how the dirty electricity is created]" (Transcript, p.857 lines 11-15).

Fourth, the tables of measurements on Exhibit 216, beginning at page 23, show the frequencies that the spectrum analyzer is measuring (column 1), as well as the FCC limits in dBum for each frequency (column 4), and the QuasiPeak and Average measurements (columns 2 and 3). If the QuasiPeak and Average measurements are less than the FCC limits, it indicates no dirty electricity exceeding the limits at that frequency (Transcript, p. 858 line 11 to p. 859 line 12). The measurements of the frequencies skip around, but the problem with Exhibit 216 is that it doesn't show frequencies at or about 300 kilohertz, which is .3 megahertz (Transcript, p. 860 line 9 to p. 861 line 15). As Mr. Bathgate stated, "the report is selectively choosing certain frequencies, not all frequencies" (Transcript, p. 861 lines 13-15). Mr. Bathgate stated there was no "graphical representations of all frequency observations" which was contrary to every report he has ever done on conduced emissions (Transcript, p. 861 lines 22-24).

Intervenors' Exhibit 51 shows the omission in IPL Exhibit 216 of conducted emissions testing at .3 megahertz is especially an issue since that appears to be a problematic frequency for Sensus technology in complying with FCC limits. Exhibit 51 is a 2006 report of the Sensus iCon meter. At page 32 of Exhibit 51 it shows tables for line 1 and on page 33 for line 2, which "an appropriate report" (Transcript, p. 862 line 13 to p. 863 line 2). And the graph at the bottom of page 33 of Exhibit 51 shows the complete data for all frequencies and non-compliance with FCC limits at the .3 megahertz frequency. The FCC limits are the horizontal lines on the graph (see "LIM FCC at the bottom of the graph showing that the horizontal lines are the FCC limits), and there is non-compliance at .3 megahertz, which is the frequency missing from the Sensus Stratus

report that is IPL Exhibit 216 (Transcript, p. 863 line 3 to p. 864 line 24). Mr. Bathgate stated that if you "go above the FCC limits at any particular frequency, you can't conclude that this device is in [FCC] compliance" (Transcript, p. 865 lines 5-18).

Exhibit 51, the Sensus iCon report, supports Mr. Bathgate's opinion because it contains no conclusion that this Sensus device complies with the voltage transient limits. Both reports are ACS reports, not FCC reports, but the 2006 report and the irregularities in IPL Exhibit 216, including the exclusion of a graph showing compliance at all frequencies, raises many questions about the purported compliance of both the Sensus iCon and Sensus Stratus meters. IPL will undoubtedly point to the difference in meters, but is the omission of a testing report for .3 megahertz and the omission of a graph showing testing of all frequencies just coincidence? Moreover, the fact that the Sensus meters are different models doesn't cure the defects in IPL Exhibit 216 (no testing of lines 1 and 2, no report on all frequencies, no accounting for outside temperatures or the attenuation of the measuring device). IPL can say these are just uncertainties, but it has the burden of proof. And as a matter of IPL's due diligence and a good safety program, Intervenors contend that IPL should either obtain supplemental test reports from ACS or authorizations from the FCC curing the defects in Exhibit 216.

IV. Even apart from the 20 cm and Voltage Transient Regulations, Customers need Protection from the Potential Harm of the Smart and Non-Smart Digital Meters

A. A Safety First Orientation Distinguishes the Expert Testimony in this Case

The precautionary principle provides insight into the different conclusions of Dr. Valberg, on the one side, and Drs. Havas and Walton, on the other, on the health issues. In pertinent part the precautionary principle (safety first) states: "The principle implies that there is a social responsibility to protect the public from exposure to harm, when scientific investigation has found a plausible risk." See the full definition in Section II (D).

The approach of Drs. Havas and Walton is to be cautious and protect the public when science has found a plausible RF radiation risk. Dr. Valberg has an opposing philosophy. He is an advocate for his client's positions, and is highly critical of virtually all RF radiation and dirty electricity research (as well as the research on many toxic chemicals; see Lipman Rebuttal Exhibit G). Dr. Valberg's approach is evident in extreme and argumentative statements such as at Valberg Direct Testimony, p. 14 lines 7-9, where he states that "[*i*]*n an abundance of precaution*, on May 31, 2011, the International Agency for Research on Cancer (IARC) classified RF electromagnetic fields as 'possibly' carcinogenic to humans" (that seeks to diminish the classification as done only out of an abundance of caution, but now scientists are saying the classification should be *probably carcinogenic* as discussed in the next Section*)*; and at Valberg Direct Testimony, p. 15 lines 8-11, he states that there is "*no* credible evidence that exposure to radio transmissions from an AMI meter causes cancer, miscarriages, or poses any other health or disease risk" (but how could anyone with a safety first approach say that there is no risk of cancer, miscarriages *or any other health or disease risk*, when many hundreds of university researchers and thousands of studies show otherwise).

Dr. Valberg's approach (and Gradient, his company's, approach) to evaluating the research deserves special scrutiny. Theirs is not an objective approach, and their reasoning is dictated by the result they want to achieve (it is "science for hire, white coats for hire" as The Center for Public Integrity states in Lipman Rebuttal Exhibit G). The Center for Public Integrity is the winner of Pulitzer Prizes for its journalism in 2014 and 2017 (Lipman Rebuttal Testimony, p. 6 lines 12-18), and in Exhibit G it describes Dr. Valberg's and Gradient's approach in more

than unflattering terms, showing they are widely criticized by scientists and major institutions.[6]

B. The Board will be the First Utility Commission to Review RF Radiation Hazards following the Game Changing National Toxicology Program (NTP) Cancer Study and the Corroborating Study by the Ramazzini Institute

Dr. Havas described the National Toxicology Program (NTP) study in her Direct and Rebuttal Testimony, as well as her beginning testimony at the hearing. The final NTP study report was November 2, 2018 (Transcript, p. 545, line 22 to p. 546 line 12). The NTP is part of the National Institutes of Health (NIH), and the former Director of the National Institute for Environmental Health Sciences (NIHES), also part of the National Institutes of Health, calls is a "game changing study." *Scientific American* reports it as demonstrating "clear evidence" linking RF radiation with heart cell cancer (Goldman Rebuttal Testimony p. 5 lines 4-6 and Goldman Rebuttal Exhibit A, p.5), and the American Cancer Society says it marks a "paradigm shift" in our understanding of RF radiation and cancer (Intervenors' Exhibit 15, p.1). While Dr. Valberg criticizes the NTP study in his pre-filed testimony, in the face of growing acceptance of the

[6] Lipman Rebuttal Exhibit G states:

> [From p. 2] The emails [with Dr. Valberg] offer a rare glimpse into a world where corporate interests can dictate their own science and scientists for hire willingly oblige. It's a phenomenon that's grown in recent decades as government-funded science dwindles. Its effects are felt not only in courtrooms but also in regulatory agencies that issue rules to try to prevent disease.
>
> [From p. 3] "They truly are the epitome of rented white coats," said Bruce Lanphear, a Simon Fraser University professor whose own research showing that even tiny amounts of lead could harm children has been called into question by Gradient scientists. A panel of experts convened by the Centers for Disease Control and Prevention concluded in 2012 that there is no reliable evidence for a safe level of lead.
>
> [From p. 4] Douglas Dockery, chairman of the environmental health department at the Harvard School of Public Health whose work on air pollution is a frequent target of Gradient scientists, described their critiques as "lame."
>
> [From p. 4] Besides publishing articles, Gradient also routinely submits comments and attends hearings when the U.S. Environmental Protection Agency is reviewing a chemical to determine its toxicity. The firm is one of several that the chemical industry relies on to stall regulations.

study's new reality, at the hearing he admitted he admitted the NTP does "good science" and he had no problems with the study's methodology (Transcript, p. 513 lines 3-11).

The NTP study is a companion to the recent Ramazzini Institute Study that also found heart cancers in rodents. Moreover, the exposure level of 0.1W/kg at which cancer occurred in the Ramazzini study was 16 times lower than the FCC maximum SAR limit of 1.6W/kg (see Havas Rebuttal Testimony, Exhibit N, right column, sixth box from the top showing an estimated SAR of 0.1[W/kg][7] and see Goldman Rebuttal Testimony, Exhibit A, p. 4 showing the FCC limit is 1.6 W/kg). The director of research at the Ramazzini Institute said that both rodent studies (the NTP and Ramazzini studies) should now result in the World Health Organization's research agency considering changing its classification of RF radiation to a "probable carcinogen" (quoted in Goldman Rebuttal Testimony, p. 5 lines 15-22).

Prior to the hearing, Dr. Valberg criticized the study (and other studies) as a cell phone and not a smart meter study in his Rebuttal Testimony, p. 18-23. But it is not disputed that they both emit RF radiation, and as Dr. Valberg admitted on cross-examination, the FCC guidelines give maximum permissible exposure to RF radiation based on the frequency of the radiation (not the kind of device. Dr. Valberg resisted agreeing to this fairly obvious point (Transcript, p. 519 line 2 to p. 522 line 15), but finally conceded that the maximum permissible exposure guidelines whether for cell phones or smart meters are based on a formula, which takes the frequency of the RF radiation and divides it by 1500 to get the guideline (Transcript, p. 521 line 2 to p. 522

[7]SAR is the specific absorption rate. At https://en.wikipedia.org/wiki/Specific_absorption_rate *Wikipedia* defines it as the power in watts per kilogram. It states:

> Specific absorption rate (SAR) is a measure of the rate at which energy is absorbed by the human body when exposed to a radio frequency (RF) electromagnetic field. It can also refer to absorption of other forms of energy by tissue, including ultrasound. It is defined as the power absorbed per mass of tissue and has units of watts per kilogram (W/kg).

line 15). As Dr. Havas stated in her Direct Testimony at p. 22, lines 4-13:

> Dr. Jonathan M. Samet, MD, University of Southern California, who was the Chair of the international group of scientists responsible for the Class 2B ("possibly carcinogenic") RF designation at IARC, stated the following at a press conference: [http://magdahavas.com/iarc-6 declares-rf-from-cell-phones-and-cell-towers-dangerous/ at 3:11 in video] [Exhibit ZZ]:
>
> The designation of Group 2B is radio frequency electromagnetic fields and is unspecified as to source. So the Group 2B classification would have broad applicability to sources with this type of emissions.

In other words, radio frequency radiation has been associated with cancers, and it is irrelevant which technologies generate these frequencies. If someone is allergic to peanuts it doesn't matter if the peanut is in a chocolate bar or a sandwich.

In his Rebuttal Testimony Dr. Valberg also criticized the notion that RF causes cancer because the American Cancer Society said in its 2014 review that "most studies have not found a link between cell phone use and the development of tumors" (Valberg Rebuttal Testimony, p. 4 lines 13-20). However, that was 2014, and understandings are changing. The American Cancer Society *now* concludes that "the NTP report linking radio frequency radiation (RFR) to two types of cancer marks a paradigm shift in our understanding of radiation and cancer risk." (Intervenors' Exhibit 15, p. 1). Note that the American Cancer Society does not say it is merely a paradigm shift in our understanding of *cell phones and cancer*; it says it is a paradigm shift in our understanding of *radio frequency and cancer*. While Dr. Valberg seeks to discredit any way he can, objective researchers understand that cell phones and smart meters both emit RF radiation and that cell phones studies can be extrapolated and should be extrapolated to guide us to the dangers of smart meters if one has a safety first perspective.

Then Dr. Valberg criticizes the NTP study because "many comparisons of exposed [RF radiated animals] to control animals showed no effects from exposure," and he said that while

male rats showed increased cancer "there was no increase in any cancer among female rats or among either male or female mice in the study." (Valberg Rebuttal Testimony, p. 5 lines 13-17). This is, again, not a safety first approach or even a fair evaluation of the research. As the more objective American Cancer Society states (Intervenors' Exhibit 15, p.2):

> The fact that this finding was observed only in male rats has some wondering if the data is not reliable. It's important to note that these sorts of gender differences often appear in carcinogenic studies, so the fact they show up here should not detract from the importance of the findings.

In addition, there can be no criticism because it was an animal study. Dr. Melnick, a prominent scientist and the principal designer of the NTP study (Havas Rebuttal Testimony, p. 8 line 21 to p. 9 line 3), says "that every agent that has been shown to produce cancer in humans has been found carcinogenic in animals . . . . [and there] is no reason to believe that a physical agent such as RFR would affect animal tissue but not human tissue." (Havas Supplemental Rebuttal Exhibit HHH, p. 3).[8]

Dr. Valberg also criticizes the NTP study on the basis of the rodents being exposed to 9 hours of radiation a day for two years, which is also addressed by Dr. Melnick and considered by him to be one of the "unfounded criticisms aimed at minimizing the findings of adverse health effects" (Havas Supplemental Rebuttal Exhibit HHH, p. 1 (title of article). Dr. Melnick responds to this criticism at Exhibit HHH, p. 4 (dealing with criticism 3). But won't some teenagers talk for 3 hours a day for several years, and won't some people, especially those most vulnerable, be exposed to smart meters when they don't pulse as intended, or when they get within the meter's

[8] As pointed out at the hearing, Dr. Valberg's pre-filed Rebuttal Testimony, p. 10 lines 7-23) also stated that the NTP study as reported in *Scientific American* showed that rates for *the* tumors (i.e., all the tumors) increased but the evidence "was weak" when, in reality, the article showed that the evidence was strong for gliomas and schwanommas (cancers), and weak only for the other cancers (Transcript, p. 498 line 2 to p. 503 line 2). Dr. Valberg admitted his pre-filed statements "could be misinterpreted." (Transcript, p. 502 line 24 to p. 503 line 2). It is a high likelihood.

near field, or when they combine with the RF radiation from cell phones and wireless. People can elect to use a cell phone or wireless or not, but with IPL's proposed program you are forced to have a radiating smart meter unless you pay extra, and warnings to stay a safe distance from the meter are ineffective (and appropriately scary), and you can only get away from the dirty electricity of a smart or digital meter if you can get an analog meter.

Finally, Dr. Valberg in his Rebuttal Testimony at page 6 lines 3-13 criticizes the NTP studies as "vastly higher than possible for the Sensus meters" based on the "specific absorption rates" in the NTP study and the Sensus meters, and the fraction of a second that the meters pulse. This is the criticism most likely to resonate with the listener, but it also has flaws and doesn't assure safety.

First, as stated earlier, the meters actually pulse for 1.2 seconds for a few months at least at start up, not small fractions of a second (non-confidential portion of Matara Rebuttal Exhibit C Public, p. 153, last paragraph), and even in a normal mode, the meters can send three transmissions every 6 seconds (Matara Rebuttal Exhibit C Public, p. 149 third to last paragraph). Second, we know there are so many seemingly small microbes and other tiny organisms that have harmful biological effects, so why does the FCC permit you to average the effect over 30 minutes and conclude that nothing serious is happening. The FCC's time-averaging concept is dependent on accepting that only the *thermal* effects of radiation cause harm, rather than the peak effect on the biology apart from any thermal effect. The specific absorption rates (SAR) that Dr. Valberg cites as the criteria for harm is a *heating effect* (NIH statement at https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3672148/; and see the Encyclopedia Britannica at https://www.britannica.com/science/radiation/Heating-effects). However, the NTP study was purposely designed by Dr. Melnick to evaluate the FCC/Valberg position that non-thermal

effects cannot cause harm. Dr. Melnick's article on the NTP study (Havas Supplemental Rebuttal Exhibit HHH, p. 1 (ABSTRACT of study) states:

> This study was designed to test the (null) hypothesis that cell phone radiation at non-thermal exposure intensities could not cause adverse health effects, and to provide dose-response data for any detected toxic or carcinogenic effects. . . . This commentary addresses several unfounded criticisms about the design and results of the NTP study that have been promoted to minimize the utility of the study. . .

The NTP study found that non-thermal effects, in fact, *cause cancer*. Dr. Melnick states that "these exposure conditions [the conditions in the NTP study] did not create thermal effects that might have impacted the overall physiology of the animal leading to increased tumor incidences in the brain, heart or other organs of exposed animals." (Havas Supplemental Rebuttal Exhibit HHH, p. 2).

C. The NTP Study Definitively Shows that Non-Thermal Effects Cause Cancer

Finding that non-thermal effects of RF radiation cause cancer is one of the paradigm shifts in our knowledge following the NTP study. The FCC guidelines are aimed at the thermal effects (adverse effects from heating tissues), which from the NTP study (as well as earlier reports) we now know is not the only danger. Havas Rebuttal Ex. MM, p. 1, is a January 19, 2012 letter from the American Academy of Environmental Medicine to the Public Utilities Commission of the State of California. It states:

> The board of the American Board of Environmental Medicine wishes to point out that existing FCC guidelines for RF safety that have been used to justify installation of "smart meters" only look at thermal tissue damage and are obsolete, since many modern studies show metabolic and genomic damage from RF and ELF exposures below the level of intensity which heats tissues. *The FCC guidelines are therefore inadequate for use in establishing public health standards*. (Italics added).

And Dr. Havas points out (Havas Rebuttal Testimony, p. 28 lines 3-9) that

> [I] n his footnote on page 9 [Valberg Direct Testimony], Dr. Valberg uses the terms "*general public safe exposure level*" when referring to the FCC guidelines. These guidelines simply ensure that there is no heating of tissue and they do not take into account any other biological effect. Dr. Valberg admits as much in his testimony on page 13, lines 15 to 17, where he states that " there are no regulations for non-thermal effects because these remain speculative . . . ."

Well, speculative no more (if they ever were), not after the NTP and Ramazzini studies. Dr. Havas points out that for many years scientists have said the current thermal-based guidelines are inadequate. In her Rebuttal Testimony, p. 22 line 24 to p. 23 line 7, she stated:

> Since 1997, EMF and RF experts have submitted at least 35 appeals stating that levels below existing guidelines are making people ill and that governments need to develop non- thermal guidelines that truly protect the health of the pubic and especially of children and 1pregnant women [citing Havas Rebuttal Exhibit AA].
>
> Of particular note is the International EMF Scientist Appeal, which was signed by more than 200 scientists and doctors who publish in this field from more than 40 countries [citing Havas Rebuttal Exhibit BB, p.3]

Using thermal effects only as a guide, the Sensus meters measured at 20 cm or a farther distance from the antennas are within FCC guidelines that permit averaging the RF pulsing over 30 minutes. But there is no evidence and no demonstration of FCC compliance based on what the RF radiation is at one inch away in the dangerous near-field area. Moreover, in her criticism of time averaging, Dr. Havas also stated that pulsing periodically is more dangerous than continuous exposure and that the maximum exposure is what's important. She said that "if you accidentally scald your hand in boiling water and immediately follow with a cold-water rinse, you will still experience damage despite the average temperature of the water being well below the boiling point." (Havas Rebuttal Testimony, p. 27 lines 18-20). Dr. Havas said that even "one pulse a day could cause problems" and, of course, the more radiation pulses the more potential for harm (Transcript p. 558, lines 2-6).

Dr. Walton agrees that considering thermal effects only and time averaging doesn't make sense because of how small effects can be amplified. He explains Dr. Martin Pall's important RF research on the mechanisms whereby small amounts of radiation, levels below those resulting in a heating effect, can have harmful effects. Walton explains that the body amplifies small effects, and he demonstrates that Dr. Pall's research shows that RF radiation causes large numbers of calcium ions to flow into the cells, and amplifications lead to a variety of "physiological observable effects" described as the VGCC mechanism (voltage gate calcium channel) (Walton Supplemental Rebuttal Testimony, p. 3 line 3 to p. 4 line 17). Dr. Walton's exhibits to his testimony show how the VGCC mechanism results in various health disorders from RF radiation, including neuropsychiatric disorders including depression (Walton Rebuttal Exhibits A and B). Walton Rebuttal Exhibit E Also explains how the non-thermal effects of radiation have been a puzzle until now.

Finally, the idea that you can time-average the radiation you are exposed to is not something accepted by others who set the safety standards. For example, the Building Biology Evaluation Guidelines that are Exhibit D to Mr. Lipman's Rebuttal Testimony are those that are compatible with the Vastu buildings. Its guidelines refer to especially "critical RF sources like pulsed or periodic signals" (Lipman Rebuttal Testimony, Ex. D, p. 4) of the kind produced by the Sensus meters, which Dr. Havas also explained is more dangerous than continuous emissions (Transcript, p. 556 line 2 to p. 558 line 11). Besides not using time averaging, the Building Biology standard considers it to be an extreme concern if there is radiation emitted in any signal of more than 1,000 microwatts per meter squared (Lipman Rebuttal Testimony, Ex. D, p. 4). This is the equivalent of 1/10 of a microwatt per centimeter squared, which is hundreds of times below what the Sensus meters emit at 7.8 inches (see Valberg Direct Testimony, p. 9 footnote 3;

the .254 milliwatts per centimeter squared reported by Dr. Valberg for the Sensus meters is 254 microwatts per centimeter squared).

D. Other Major Health Hazards of RF Radiation are Reproductive Problems and Harm to others who are especially Vulnerable

Drs. Havas and Walton characterize the non-cancer health hazards of RF radiation as being reproductive hazards, and hazards to those with EHS, children and others who are especially vulnerable (Havas Rebuttal Testimony, p. 7 lines 5-5 and Walton Rebuttal Exhibit G).

In these areas as well, Dr. Valberg advocates that there is no possible harm, characterizing all studies showing the health hazards as not being reliable. See Havas Supplemental Rebuttal Testimony, p. 12 line 10 to p. 13 end of page. Dr. Valberg claims that the research showing reproductive harm from RF radiation is "unreliable," after which Dr. Havas presents a more objective review of the research that characterizes two studies and four reviews indicating little or no effect of RF radiation on sperm reproduction and 20 studies showing harmful effects).

Concerning electro hypersensitivity (EHS), Dr. Havas believes the scientific community thinks 8-10% of the population in a highly built up city are EHS with severe symptoms from RF and dirty electricity, whereas Dr. Havas thinks her conservative estimate is 3-5% with severe symptoms but another 35 % with mild to moderate symptoms (Transcript, p. 561 line 13 to p. 562 line 6). In the 30 to 5% group, she said you could not be in the Board's hearing building without suffering for days or weeks afterwards (Transcript, p. 562 lines 7-12).

Walton Rebuttal Exhibit G explains why children are more vulnerable to low levels of RF radiation. Exhibit G is a 2014 article published in the *Journal of Microscopy and Ultrastructure* entitled "Why children absorb more microwave radiation than adults: The consequences." Page 1 in the Abstract states:

> Computer simulation using MRI scans of children is the only possible way to determine the microwave radiation (MWR) absorbed in specific tissues in children. Children absorb more MWR than adults because their brain tissues are more absorbent, their skulls are thinner and their relative size is smaller. MWR from wireless devices has been declared a possible human carcinogen. Children are at greater risk than adults when exposed to any carcinogen. Because the average latency time between first exposure and diagnosis of a tumor can be decades, tumors induced in children may not be diagnosed until well into adulthood. The fetus is particularly vulnerable to MWR. MWR exposure can result in degeneration of the protective myelin sheath that surrounds brain neurons.

E. Dr. Havas Concludes the Sensus Smart Meters are Hazardous to Health

In her Rebuttal Testimony, p. 28 lines 17 to 21 Dr. Havas states:

> A child sleeping within 15 feet of a Sensus smart meter would be exposed to levels associated with childhood leukemia as shown in Figure 4 above (A). Adults with EHS may experience heart palpitations (B) within 5 feet of a Sensus smart meter. Adults and children may experience cardiac effects, impaired sleep, fatigue, headaches, and irritability within 100 yards of a Sensus smart meter (D and E above). These levels and these potential effects are not trivial. (*References A-E are to charts in her exhibits).*

For her Supplemental Rebuttal Testimony, pp. 19-20, Dr. Havas reviewed IPL's supplemental response to Interrogatory 25 (Intervenors Exhibit 35) (see the source of her Table 1 on p. 20 on the intensity of RFR compared to the research on RF harmful effects). In her Supplemental Rebuttal Testimony at p. 20, lines 7-11, she states:

> The intensity of RFR decreases rapidly with distance. However, within 1 foot, maximum values for both 900 and 940 MHz exceed values that have been associated with cancer mortality (red**). Similarly values at 3 feet exceed levels shown to cause heart palpitations in a provocation study (blue*). In my opinion these levels pose an unacceptable risk for long-term exposure to a segment of the population.

Based on what we now know (erg., see footnote 8) the Sensus meters RF radiation at 20 cm is 42% of the FCC guideline before applying the time averaging. See Section III (A)(1) of

this Brief (Basic Information about RF radiation). But while time averaging is applicable to the far-field under the FCC guidelines, it is not applicable to the near-field), and the adverse consequences can be far reaching. Just as the radiation decreases rapidly with distance as Dr. Havas states, it also increases rapidly with distance (see definition of the near-field in an earlier section, and Valberg Schedule D, p. 140 and p. 153), and the public can be only one inch away, which is within the especially concerning *reactive* near-field area.

And second, while Dr. Havas says in her quote, above, that the research shows harm to a *segment* of the population, that is a sizeable segment. See Dr. Havas' Rebuttal Testimony, at p. 33 line 11 to p. 34 line 3, and especially at p. 34 lines 1-3, where she states:

> If we add up how many people are potentially sensitive to this radiation 1 (i.e. those with EHS; cancer or family history of cancer; children; elderly; those with an immune 2 insufficiency…) then we are talking about more than 50% of the population.

F. <u>The Foreseeable Outcome of the NTP Study will be a Greater Recognition of the Hazards of RF Radiation</u>

What is the foreseeable outcome of the NTP and other research? There will certainly be increased pressure to better protect the public, and this appears to be happening already. In issuing its press release on the NTP study (Intervenors' Exhibit 15, p. 2) , the American Cancer Society ("ACS") said

> [t]his new evidence will undoubtedly factor into ongoing assessments by regulators to determine the potential cancer risks posed by cell phones. The American Cancer Society *eagerly awaits guidance from government agencies*, like the U.S. Food and Drug Administration (FDA) and the Federal Communications Commission (FCC), about the safety of cell phone use." (Italics added).

What kind of guidance is the American Cancer Society ("ACS") looking for? Mr. Callisto had Dr. Valberg read the foregoing ACS quote in Dr. Valberg's redirect examination,

and we expect IPL's brief to cite it as well, purportedly to demonstrate that the FCC guidelines are all that matter. That isn't how we see it. The ACS already has guidelines from the FCC and FDA so the ACS isn't eagerly waiting for that guidance; it already has it. The ACS is obviously waiting for new guidance (i.e., new guidelines) to protect the public. That would be consistent with ACS's statement that the NTP study is "a paradigm shift in our understanding of radiation and cancer risk" (Intervenors' Exhibit 15, p. 1). Dr. Melnick also believes there will be changes. He states that "if the recent animal and mechanistic findings had been available in 2011, it is likely that RFR (radiation) would have been classified as a probable human carcinogen." Havas Supplemental Rebuttal Exhibit HHH, p. 5 (above the Addendum).

G. <u>For Some the Smart Meters will Radiate Hundreds or Thousands of Times Per Week and at Least for Months the on-air time for Each Pulse could be 1.2 Seconds not only a few Milliseconds</u>

The last paragraph of Matara Rebuttal Exhibit C Public, p. 153 explains during commissioning or tune up how "boost mode" can result in pulsing for 1.2 seconds at a time. And IPL Exhibit 217 sets forth the number of times the meters will transmit for Iowa and Wisconsin over a two-month period. Exhibit 217 needs to be viewed in light of IPL's outright refusal to provide this information even in the face of a motion to compel. In its resistance to Intervenors' Motion to Compel, it stated that it couldn't anticipate the number of times the meters would pulse and that there are no numbers on pulsing (see Motion to Compel). Even upon being ordered to provide certain information in Exhibit 217, IPL failed to tell Intervenors the high number of times the meters pulsed *per day*, and we don't know how many people will have their meters transmit less than 3,000 times a week but a great many times, since IPL chose to tell Intervenors and the Board only how many meters were transmitting more than that number. How many electric meters for example in Iowa and Wisconsin are transmitting more than 500 times a

week or 1,000 or 1,500 and so on. Mr. Bauer said the top 20 or 25 meters would be pulsing over 1,000 pulses a week (Transcript, p. 119 line 21 to p. 121 line 5), but Mr. Bauer lacked certainty about those numbers, and while 1,000 times a week may be acceptable to IPL, it may be hazardous to someone with EHS or cancer, and unacceptable to someone who has been told on the website or in brochures that it would "signal" six times a day?

This excessive RF radiation being emitted also does not appear to simply be a tune up issue. In Wisconsin, after 10 years of service, there are always 2-4 meters transmitting over 4,500 times a week (IPL Exhibit 217), which is pretty much the same as in Iowa, and what is the number of meters in Wisconsin with pulsing over 2,500 or 2,000, or 1,000 a day. We don't know despite asking for that information.

Intervenors also sought to determine the number of meters included in the chart that IPL said were transmitting only once per week. The bottom line of Mr. Bauer's testimony was that he didn't know (Transcript, p. 113 line 20 to p. 115 line 25). Without knowing the number of meters in each total that were transmitting only once a week we don't know what the true average number of transmissions was for either Iowa or Wisconsin. IPL says it is a tune up problem, the Wisconsin evidence says it's not (after 10 years, Wisconsin actually has as many or more electric meters transmitting at even higher rates than Iowa; see IPL Exhibit 217).

Mr. Bauer testified at some length that IPL was continually "substituting out each week the meters that show the high transmissions" (Transcript, p. 125 lines 20-23), which appears to be something a person designated to speak on this issue would know, but he then agreed with IPL's supplemental response to Interrogatory 8, that it was "the same 9 meters each week causing this issue" (Intervenor's Exhibit 3, p. 4). We still don't know. If it is the same 9 meters each week, why are there only 2 or 3 electric meters in Iowa and 2-4 meters in Wisconsin that

are pulsing over 3,000 times a week during the 8-week period for which IPL provided information in IPL Exhibit 217. In all events, the meters will radiate a lot for at least some people, and we don't know if those exposed to the radiation will include the electro hypersensitive (EHS), or children, or others who are especially vulnerable.[9]

One last aspect of the pulsing that is relevant is IPL's failure to notify the residents that their meters were transmitting thousands of times per week. When asked why the meters that were transmitting thousands of times a week weren't substituted out, Mr. Bauer said IPL will do that (Transcript, p. 126 lines 3-5), and he said "we should have changed them out faster, I would agree" (Transcript, p. 126 lines 6-13). IPL Exhibit 217 shows IPL didn't notify customers for two months as of the first hearing and based on Ms. Leyden-Van Gundy's knowledge, may not have done so as of the December hearing. Intervenors' ruling requests (Section X) ask that IPL inform customers how many times their meters are pulsing or transmitting and ensure prompt replacement of high transmission meters.

H. The Smart and Non-Smart Digital Meters Pose Risks to Health from Dirty Electricity

Dr. Havas' Rebuttal Testimony describes high voltage transients (or dirty electricity), as well as her testimony at the hearing. Dirty electricity is not the "nice 60 hertz sine wave" but the "irregular pulsing that's on a continuous basis along the wire in the wall." (Transcript, p. 558 line 25 to p. 559 line 12). The interference of these transients with equipment is comparable to the interference with the electromagnetic nature of human cells (Transcript, p. 559 lines 13-18). Analog meters have no electronics within them and do not create low voltage DC, therefore they do not create any dirty electricity (Bathgate Rebuttal Testimony, lines 10-13).

[9] Children were mentioned in the previous section and Dr. Havas explains that the EHS population "react [to EMFs] at much lower levels, much lower intensities than the rest of the population" (Transcript, p. 561 lines 13-16).

Milham and Morgan (Havas Rebuttal Exhibit KK) reported increased risk of cancers among teachers exposed to dirty electricity in the classroom and the greater their exposure, the greater the risk (Havas Rebuttal Testimony, p. 18). Conversely, reducing dirty electricity in schools (remediation through filters) reduced teacher symptoms associated with EHS and improved student behavior (Havas Rebuttal Testimony, p. 20 and Havas Rebuttal Exhibit JJ).

Dr. Havas reported (Havas Rebuttal Testimony, p. 19 lines 3-13) she has worked with pre-diabetics and diabetics who have great difficulty regulating their blood sugar in an environment where they are exposed to dirty electricity. At lines 7-9, she said:

> When levels of dirty electricity are high their blood sugar increases rapidly (within a matter of 20 minutes) and when they move to an electromagnetically clean environment their blood sugar drops just as rapidly.

She reported also doing studies with people with multiple sclerosis and found their symptoms improve when dirty electricity in the homes is reduced (Havas Rebuttal Testimony, p. 19 line 21 to p. 20 line 6).

What can be done about dirty electricity? Ms. Matara testified that she believes that analogs are necessary because they don't produce dirty electricity, and she is not aware of filters that can fully filter the electronics. In response to Chairperson Huser, Ms. Matara said (Transcript, p. 799 line 23 to p. 800 line 7):

> I don't know of any filters that filter more than 50 percent of it. I do Believe that in our future that just like there will some day be a cure for cancer, that there will be a technology that fully filters the dirty electricity. From my perspective, and I think the consumer's perspective in general, is that we would like to stick with the analog meter until this advanced filtering system exists and is tested and proven and we know that it will take care of that.

Mr. Bathgate's pre-filed testimony stated that most electronics have a filter that reduces dirty electricity to acceptable levels. The electronics can be removed if they don't have a filter,

but that can't be done with a meter (Bathgate Rebuttal Testimony, p. 4 lines 3-6). As a result, IPL would have to make sure its manufacturers provided a meter with an appropriate filter, as well as proper certification reports of FCC compliance. Intervenors don't believe IPL's meters have filters within the meter.

V. IPL Customers Should be able to Choose Analog Meters

A. Customer Choice is Important to Determining a Non-Standard Meter

In Mr. Bauer's Direct Testimony, p.8 lines 7-8 he stated that "IPL is willing to provide a reasonable alternative to respond to that customer preference [for a non-AMI meter]." On cross examination he also testified that he understood that the opt out charges, opt out conditions, and even the choice of a meter have to be reasonable (Bauer testimony, Transcript, p. 86 line 24 to p. 87 line 6), and he said that if there is a safety issue or cost issue, then he agrees that IPL needs to "fairly evaluate the choice of the consumer" (Transcript, p. 87 lines 9-18). There are, of course, safety and cost issues that Intervenors and their experts raised at the hearing.

However, Mr. Bauer stated in his direct testimony that a Board order requiring IPL to allow customers to select an analog meter is not consistent with the Board-approved tariffs that state that IPL "will determine suitable metering equipment" (Bauer Direct Testimony, p. 15 lines 19-21). This, however, is a misstatement of the tariff language. Mr. Bauer's statement that IPL determines what is suitable equipment is not what the tariff states. Original Tariff No. 1 (Intervenors' Exhibit 1, p. 1) states that "Company [IPL] will install, own and maintain suitable metering equipment necessary for measuring electrical energy supplied in accordance with Company's applicable rate schedule . . . ." The tariff does *not* state that IPL shall install, own and maintain *what it determines is suitable equipment*. The tariff does not set forth a purely subjective or discretionary test where IPL alone decides on a meter.

What is suitable has an objective (reasonable) element to it that should require IPL to take into account the customer's choice where it is reasonable, in good faith, and objectively based, since the customers have no alternative source of electricity. Mr. Bauer finally admitted that customer concerns were important to the non-standard meter decision, and that "IPL tried to address those concerns in creating the non-smart digital meter" (Transcript, p. 44 lines 17 to 23).

B. IPL Customers are Choosing Analog Meters even When Told that Analogs are Unavailable

After a discussion with Mr. Bauer of the number of customers requesting an opt out meter, Mr. Bauer admitted that "[m]aybe it's 40 percent, maybe it's 50 percent . . . but a very substantial percentage of those who told [IPL] they want a non-standard meter want an analog meter" (Transcript p. 81 line 16 to p. 82 line 5), And Mr. Bauer agreed "that [the 40-50 percent number] is despite IPL telling them (the opt outs) you can't have an analog meter." (Transcript, p. 82 lines 6-16). And looking at the complaints in the docket, customers are not clamoring for non-smart digital meters as compared to analog meters. If they speak to this issue, they say they want their analog meters. As of the December 5, 2018 hearing, based on the 4th Supplemental Response to Lipman Interrogatory No. 22 (Intervenors' Hearing Exhibit 49, p. 2), there were 1990 customers who were on IPL's hold list and had opted out representing 1,892 electric and 1,029 gas meters. And 45% of those numbers (Bauer says 40% to 50% want analogs), represents approximately 895 customers who desire 851 electric analog meters and 464 gas meters, despite being told they were not available.

C. Analog Meters are Especially important to the Fairfield/Vedic City and MUM communities

Fairfield/Vedic City and the MUM community, including those in Vastu homes desire analog meters. Mr. Bauer acknowledged that Fairfield Mayor Malloy was trying to figure out

"whether something other than wireless" could be used in the town (Transcript, p. 91 lines 7-19), and the number of those opting out show they want analog meters. Dr. Hagelin, the President of Maharishi University (MUM), has written to express the desire that the University, with its over 2,000 faculty, students and staff, and the over 70 homes where they are the landlord be permitted to have *analog* meters (Intervenors' Exhibit 63).

Mr. Lipman testified about the evolution in his understanding of dirty electricity and some of the economic aspects of this issue. He has been the consulting architect on $200 million of new construction in Iowa using the Vastu building principles (Lipman Rebuttal Testimony, p.4, lines 1-4). One of its key strategies "is reducing electromagnetic radiation (including radio frequency)" (Lipman Rebuttal Testimony, p. 4 lines 12-13). As a result "Vastu buildings are built with a series of tactics including using metal-shielding cabling at all electrical wiring to prevent electrical radiation [controls dirty electricity], and ethernet ports throughout the house so that wifi can be avoided" (Lipman Rebuttal Testimony, p. 4, lines 13-15). Builders of Vastu homes must acknowledge that they will follow the guidelines on Exhibit C to his testimony "to obtain certification that the building was constructed in accordance with the Vastu guidelines" (Lipman Rebuttal Testimony, p.4, lines 18-19), including low EMF guidelines (Lipman Rebuttal Exhibit C, ¶5). Exhibits D and E to the Lipman Rebuttal Testimony are two of the guidelines he referenced. Mr. Lipman states "that not being able to opt out to analog meters would depress purchases and construction of these [Vastu] homes" Lipman Rebuttal Testimony, p. 7, lines 1-2).

An evolution in understanding dirty electricity

Emily Kelly testified to the evolution of the knowledge of the hazards of RF radiation and especially dirty electricity (Transcript, p. 943 line 8 to p. 946 line 10). She has been a part of Fairfield Safe Meters so people in the community talk to her all the time. (Transcript, p. 944 lines

5-13). She acknowledged that "two or three years ago [she had] no knowledge of dirty electricity," (Transcript, p. 943 lines 18-20) and for the people that she had a sense of, there is "an evolution in their understanding of dirty electricity" (Transcript, p. 944 lines 14 – 17). She said in Fairfield, "the dirty electricity has sort of hit home as people are starting to measure their homes and see what's going on . . . . That hit home for me" (Transcript, p. 946 lines 3-10).

IPL may seek to characterize the Fairfield/Vedic City and MUM communities as being indifferent to digital meters, but that is just not the case. The petitions and personal statements from the Fairfield/Vedic City community ask for digital meters and many people are obviously supporting the Intervenors' efforts in this Docket.

In his pre-filed testimony, Mr. Goldman testified about his sensitivities to dirty electricity and wireless computing (Transcript, p. 3 line 18 to p. 4 line 15), and that in deciding to move to Fairfield from New York, he wanted a home with the Vastu principles. He even paid extra for a home "that uses a metal conduit to encase the wires running in the walls . . . to prevent the electromagnetic fields from flowing into the home, other than through the outlets when an appliance is plugged in" (Transcript, p. 7 lines 18-21). Mr. Lipman explained that "anyone within a house that has a non-radiating smart meter [digital meter] who is within two or three feet of a wire is potentially at risk from dirty electricity" and that analog meters don't give off RF radiation or dirty electricity (Transcript, p. 903 lines 16-24).

Ms. Town, a real estate agent in Fairfield, knows the market for Vastu homes in the Fairfield/Vedic City area. Her testimony also shows the present concerns about dirty electricity (Town Rebuttal Testimony, p. 3 line 7 to p.4 line 3):[10]

[10] Please note that Ms. Town made a correction to her Rebuttal Testimony. Her Corrected Rebuttal Testimony, p. 2 lines 6-11, filed on or about October 31, 2018 states:

> On page 2 lines 14 to 16 of my prior Rebuttal Testimony I answered a question about talking to or representing buyers or sellers of Vastu homes and said that "On average over a 12-month

> The buyers of the Vastu homes are the demographic that is very concerned about smart meters and dirty electricity. I get questions regularly about this when showing Vastu homes. Buyers want to know who can test the home and give me some assurances about this and they want it to be done during their inspection period as a condition to the purchase.
>
> I usually recommend that they have an inspection of the house for EMF and dirty electricity and tell them that we don't yet have smart electric meters, but it may be coming.
>
> **Q. Do you have an opinion on what would happen to the market for Vastu homes in Fairfield if the buyers cannot get homes without smart meters?**
>
> A. Yes. I believe it will significantly affect the market. Buyers will seek other options. They just don't want homes with smart meters and they don't want homes with dirty electricity. They may decide not to buy in Fairfield or relocate here.

Mr. Cronk speculated that the RF radiation would not affect the sales price of a Vastu home. But while RF radiation may not be a factor in the value of homes *in most of Iowa*, that is not the case in the Fairfield/Vedic City area, and especially in the properties in Maharishi Vedic City, the homes on the Maharishi University campus (200 homes according to the comment letter of MUM's general counsel, filed December 26, 2018), and in the North MUM Campus Village area. Mr. Cronk testified that he's never asked [buyers or sellers] whether "there were negotiations about the RF radiation in the house" (Transcript p. 181 lines 23-25). He speculated that "I think in the vast majority of cases buyers and sellers [throughout Iowa as a whole] are not talking about that" (Transcript, p. 182 lines 5-6). However, whether they are talking about that throughout Iowa, they are talking about it in Fairfield/Vedic City and MUM communities, and Mr. Cronk admitted that he had not "appraised a home in Fairfield . . . with Vastu design" . . . ., and he said "I don't know what those conversations are" (Transcript, p. 182 lines 10-14).

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period I would say that I discuss with or represent as a sales agent seven or eight buyers or sellers of these homes." What I intended to say was that on average over a 12-month period I discuss with or represent seven or eight buyers or sellers per month of these Vastu homes. I left out the words "per month" in my previous testimony.

IPL Exhibit 222 also shows that Mr. Cronk is unaware of the premium paid for Vastu homes in the Fairfield/Vedic City/MUM community. Mr. Marcus stated that at the hearing and described the lawsuit he brought (Transcript, p 186 line16 to p. 190 line 22), and the petition (IPL Exhibit 222) from the Fairfielders knowing the Vastu market states:

> These homes and buildings are bought at premium cost, and [we] often pay up to 40% more in real estate taxes to the city of Fairfield due to the specific Maharishi Vastu form of architecture employed.

This value will go down for all owners of Vastu homes if analog meters are not permitted.

IPL introduced its Exhibit 224 to show that most of the solar users had digital meters, rather than analog meters. But that is for two reasons. First, IPL has a present requirement to have a digital meter that measures a "two-way flow" (Transcript, p. 931 lines 3 to 16), and, second, there is an evolution in the Fairfield/Vedic City community in understanding dirty electricity and understanding that there can be complaints to the Board and not just to IPL (Transcript, p. 932 line 9 to 936 line 11). Note, for example, that in the petition that is IPL Exhibit 222, the over 1,000 people who signed it asking for analog meters were petitioning IPL, not the Board, to have analog meters on the MUM campus,[11] and they were telling IPL that they "were willing" not "eager" to read the meters themselves to do that. As Ms. Kelly said, people were so "desperate;" they were pleading to IPL (Transcript, p. 935 lines 23-25). It is ironic that IPL was calling the shots that self-reading of meters in a short window of time would be

[11] IPL Exhibit 222, the petition from those in the MUM community, states (above the signatures):

> We, the undersigned, residents of the city of Fairfield, Iowa, petition Alliant energy to opt out of all residences, private or otherwise, on the campus of Maharishi University of Management from smart meter technology. We understand Alliant has no desire to force upon us a technology we do not want and is specifically contrary to our life style and choice of environment. *We petition to keep only analog meters for electric and gas and uninstall all wireless and or digital meters and replace with analog meters. We are willing to self-report monthly readings from analog meters to the satisfaction of Alliant energy.* (Italics added).

necessary, and now seeks to hold it against the Fairfielders that they were willing to toe the line in order to get analog meters.

Most importantly, all or most of the solar users (with digital meters) have now petitioned for analog meters. 54 out of 67 solar users in the Fairfield area have now signed the petitions for analog meters (Transcript p. 916 lines 10-25), which are fine for solar. Mr. Bauer agreed that two analog meters will measure the in and out power (Transcript p. 91 line 24 to p. 92 line 2).[12]

IPL also sought to undermine Mr. Lipman's testimony through IPL rebuttal testimony that Access Energy has had smart meters for many years. However, Mr. Lipman's initial testimony is supported by his Supplemental Rebuttal Testimony and exhibits showing that the Access Energy Vastu homes in Fairfield and Vedic City are not inconsistent with the Vastu RF radiation principles. Access Energy uses a wired technology, the TWACS power line technology, rather than wireless, to send signals from their smart meters to the Access home offices (Lipman Supplemental Rebuttal Testimony, p. 2 ("although Access Energy has had smart meters for some time, its transmissions are sent by wired, not wireless technologies"). And see Exhibits H, I, J, and K to the Lipman Supplemental Rebuttal Testimony showing the Access Energy system is a "wired" technology, "wired" is the opposite of "wireless" and the TWACS power line technology is well understood to be wireless. Mr. Lipman cites statements from the Access Energy engineers who have consistently stated that Access [Energy] "does not send

[12] IPL may also seek to undermine Mr. Lipman's credibility about desiring analog meters through a selective reference to IPL Exhibit 200 , which is Mr. Lipman's answers to interrogatories on his use of cell phones, wireless handsets, and computers. Like most people, he has had a cell phone for 12 years (IPL Exhibit 200, p. 1), but his estimated use is only about 2 minutes per day (Exhibit 200, p. 2);and his use of a wireless handset is only in hotels and about 2 minutes per year (Exhibit 200, p. 2); and his use of a laptop computer, while perhaps 5 hours a day (Exhibit 200, p. 2), is necessary for business and is not through wireless. He has not owned a television since 1979 (Exhibit 200, p.2). Ms. Matara's answers were similar. Obviously, they are careful about RF radiation and dirty electricity.

information out by wireless networks" (Lipman Supplemental Rebuttal Testimony, Ex. D, p. 3, bottom of page).

Exhibit F to Mr. Lipman's Rebuttal Testimony gives some greater appreciation of what preserving the MUM/Vastu culture means to those making Fairfield/Vedic City or the University campus their home. The letter (see summary in the footnote below) is to the Iowa Attorney General from the North Campus Village Board of Directors on behalf of their residents. North Campus Village is adjacent to University buildings (Exhibit F, p. 1).[13]

D. IPL has not Stated Good Reasons to Deny Customers their Choice of an Analog Meter

Ms. Matara's Interrogatory No. 2 and IPL's response is Intervenors' Exhibit 24, which is repeated below:

MATARA INTERROGATORY NO. 2:

State all reasons, if any:

(a) why IPL will not allow customers to opt out and retain their analog meters, if they have one, and

(b) for customers who don't have an analog meter, why IPL will not purchase and install analog meters for customers who want to opt out of the smart meter programs.

IPL RESPONSE:

(a) IPL has not purchased new analog meters since 2010. It has been IPL's practice when an analog fails to replace it with a digital meter. In fact, prior to the deployment of AMI meters, digital meters were IPL's standard meter.

[13] Lipman Rebuttal Exhibit F states that (1) there were 80 homes in North Campus Village as of March, 2018, and 60 more are coming, (2) it is home to university administrators, faculty, staff, business people, retirees and children, (3) it is the largest residential Maharishi Vedic architecture (Vastu) community in the U.S. and is "an example of this unique architecture to people worldwide," (Exhibit F, p. 1), (4) all homes in the Village are built in accordance with these Vastu principles, and (5) smart meters "are in violation of the principles" and "would degrade the architectural authenticity."

> Additionally, IPL has to comply with statistical testing requirements; it is less costly to manage those requirements for a single type of non-AMI meter, in lieu of managing it for multiple non-AMI meter types, thereby benefitting customers.
>
> (b) Please see the response to (a).

These are not good reasons for denying a customer an analog meter (especially where digital meters produce dirty electricity or voltage transients, a safety issue, which Mr. Bauer conceded would permit different meters), and where IPL has not met its burden of proof to show that its NSMA digital meter, the Centron Itron C1S, has passed any dirty electricity test whatsoever, even though they are required.

The first of the IPL reasons for refusing to permit analog meters is that IPL has not purchased new analogs meters since 2010, but that doesn't mean that the analog meters currently in use won't last for many years. In Lipman Rebuttal Testimony, Ex. A, p. 19, IPL admits that analog meters last 30-35 years without having to be replaced, which is longer than digital meters (Lipman Rebuttal Testimony, Ex. A, p. 16 and Intervenors' Motion in Limine, Ex. A, p. 6). Mr. Bauer substantiated the long useful life of analog meters when he admitted to the OCA that there are "a substantial amount of [analog] meters that are still being used that were installed even from 1950 to 1979" (Transcript, p. 48 lines 2-11).

Importantly, the OCA's cross-examination of Mr. Bauer elicited the admissions that IPL was removing approximately 370,000 analog meters (Transcript, p. 44 lines 11-15); that approximately 75,000 of those analog meters were installed between 2000 and 2010 (Transcript, p. 49 lines 1-6); that those meters, if manufactured anywhere close to the dates of installation would still have useful lives (Transcript, p. 49 lines 7-10); and that it would be possible to create an inventory of 2,000 to 3,000 analog meters assuming they tested correctly (Transcript, p. 49, lines 11-14). In addition, there is a market for used and refurbished analog meters that many

other utilities are using for customers who want analogs that are not in IPL's inventory (Bauer Rebuttal Testimony, p.7 lines 5-10), and there is no indication that refurbished analogs can't be used if any IPL inventory runs out.

Mr. Bauer admitted in the Intervenors' cross-examination that he doesn't know the market for analog meters other than he says new analogs are not being offered and technology has changed (Transcript, p. 71, lines 2-16). He admitted he didn't know if "refurbishers have people complaining all the time that there's something wrong with these [refurbished] analogs;" and he didn't call the utilities in his Direct Testimony chart (i.e., a chart of what other utilities are doing for their opt out programs) that are using refurbished analog meters to ask whether they were "satisfied [with the analogs] in terms of reliability and accuracy;" and that, with one exception, Vision Metering, a company IPL "has a relationship with," who would sell IPL refurbished analog meters, he didn't call the "refurbishers of analogs . . . to determine anything about the refurbished analogs they're selling" (Transcript, p. 73 lines 3 -21). Mr. Bauer must believe Vision Metering is reliable or he wouldn't have a relationship with it, and those offering analog meters include General Electric, the seller of the GE I-70 referred to in Goldman Rebuttal Testimony Exhibit B, p. 4 (bottom of page), whose web address (contains the words "analog-meter-new") indicating it may even be offering new analog meters (https://www.smud.org/-/media/Documents/Electric-Rates/Residential-and-Business-Rate-information/PDFs/GE-I70-analog-meter- new.ashx?la=en&hash=1F8961506CF809F93C130B6B1F8283C457C61378.

Other than IPL saying it has been its practice to replace failed analog meters with digital meters, the only other reason given by IPL in its answer under oath to Ms. Matara's interrogatory was that it is less costly to do statistical testing for a single type of non-AMI meter. Cross examination, however, showed the cost to be insignificant. Mr. Bauer admitted that the

cost to do statistical testing for both a digital as well as an analog NSMA (if there were two opt out meters) would a be zero (no charge for two different NSMA meters as compared to one NSMA meter) or relatively small (Transcript p. 74 line 14 to p. 77 line 23).

Mr. Bauer's chart at Bauer Rebuttal Testimony, Ex. A, p. 1 can be analyzed to show the number of extra meters, if any, that would have to be statistically tested if there was only a digital meter opt out as compared with the number of meters that would have to be tested if there were both digital and analog meters in the opt out pool. If there were 155 meters in one opt out test lot (all digital meters), there will be 15 meters to test, and if the 155 meters consisted of 120 digitals and 35 analogs, there will also be 15 meters to test (Transcript p.75 line 13 to p. 76 line 14). No difference in cost. And if there were 300 in a statistical test lot, if they consisted of all digital meters in one lot, there will be 20 meters to test, whereas if they were in two test lots consisting of 200 digitals and 100 analogs, there would be 25 meters to test (Transcript, p. 76 line 18 to p. 77 line 7), resulting in testing only five extra meters.

Mr. Bauer said the actual cost to test five extra meters is "50 to 100 bucks a meter" (Transcript, p. 77, lines 9-11). Mr. Reed then elaborated on what that cost consisted of saying:

> A. [Y]ou have to roll a truck to go—you have to physically go roll a truck, physically remove that meter, put a different meter in, bring that meter back to the test lab—or the meter test shop and test it.
>
> Q. Okay. So it could be, according to your testimony, 50 bucks or $250
>
> A. I said 50 to 100 dollars.

(Transcript p. 77 lines 12-18). According to this statement the 50-100 dollars per meter, or $500 maximum cost each time 300 meters have to be tested, includes the truck roll and the actual testing, plus on redirect, Mr. Bauer said the cost would include an inventory cost of an unspecified amount (Transcript, p. 170 lines 2-8). Mr. Bauer on redirect also mentioned a cost

for the test (p. 170 lines 9-12), but that testing cost was already included by him in the $50 to $100 per meter cost above. The bottom line is that a cost of $500 or so each time 300 meters are tested, plus an inventory cost, is *not* a significant cost, and it was the principal reason given under oath in answer to Ms. Matara's interrogatory to state *all* reasons IPL would not permit analog meters as a non-standard meter.

Dr. Shi spoke for the OCA and also stated he did not believe IPL's desire for a single test lot had merit. At p. 7 lines 4-11 of his Direct and Rebuttal Testimony, he states:

> Many different types or models of meters can be in-service at the same time. For example, prior to its deployment of AMI, IPL had meters manufactured and installed over a large time frame, from as early as pre-1930 to present. *See* IPL Data Response to OCA Data Request No. 1, attached as OCA 10 Shi Direct Exhibits 1. It is reasonable to believe that IPL's current electric meters are not homogenous. It is very likely that some of IPL's current meter test lots are not very large in size. IPL's meter testing procedure can accommodate having some analog meters in its meter test lots.

IPL Exhibit 214, p. 1, shows IPL is installing six varieties of Sensus iCon meters and a Sensus Stratus meter, as well as Honeywell meters (Intervenors' Exhibit 3, p.2). Intervenors' Exhibit 53, pp. 3-4 shows there are many different types and models of Stratus, iCon, and Honeywell meters.

E. <u>Analogs are Accurate and any that Fail Testing can be Replaced with Analog meters</u>

After discovery in this case closed, and without ever supplementing its answer to Ms. Matara's Interrogatory No. 2 (Intervenors' Exhibit 24), IPL first claimed in Mr. Bauer's rebuttal testimony filed October 8, 2018, that analogs are too inaccurate to be a non-standard meter. This afterthought is set forth in Mr. Bauer's rebuttal testimony in a chart of analog and digital meters that were removed as part of its AMI deployment. That chart shows that 1.9% of analog meters that were removed were outside the 2% accuracy range whereas only .4 % of digital meters were

outside the range (Bauer Rebuttal Testimony, chart at top of p. 7). But as the OCA brought out in cross-examination of Mr. Bauer, (1) many of the analogs that are in place in Iowa go back to before the 1930s, whereas it was 2010 when IPL stopped buying the analog meters that the digitals were compared to (Transcript, p. 21 lines 16-23), and (2) that it was reasonable to assume that if you are testing analog meters that may be 70 to 80 years old and comparing them to digitals that are less than 10 years old, the inaccuracy rate of the analogs would be higher just due to the age (Transcript, p. 63 lines 16 to 23). There is also no indication in the case that the analogs were selected based on a random sampling, or whether these were simply the oldest of the analog meters, and there are questions IPL would not answer for the Intervenors once they learned IPL was claiming that analogs were inaccurate (see Intervenors' Motion in Limine, Ex. B).

Moreover, Mr. Bauer admitted to the OCA that approximately 75,000 analog meters were installed between 2000 and 2010 (Transcript, p. 49 lines 1-6), which, even if manufactured earlier than their installation date, would have less than 10 years of use (Transcript, p. 49 lines 7-10). Since IPL agrees that they last 30-35 years before needing to be replaced (Lipman Rebuttal Testimony, Exhibit. A, p. 19), they would be accurate. How could they last 35 years without having to be replaced if the analogs were inaccurate?

In all the years IPL has used analogs, Mr. Bauer said he could not remember IPL complaining to the IUB that the analogs are inaccurate and IPL has to get rid of them (Transcript, p. 98 lines 18-24), and Iowans have confidence in them. Mindy Slippy of Cedar Rapids says, "my [analog] meter has been working fine for 21 years. I never needed a single repair" (Intervenors Hearing Ex. 38, p.1). Dr. Schoechle stated that there are "very few products

in industrial history that have been as reliable as an old analog meter" (Transcript, p.833 lines 4-9).

F. The Great Majority of Utilities Analyzed Permit a Customer to Retain an Analog Meter or Replace a Smart Meter with an Analog Meter

Mr. Goldman's chart (Goldman Rebuttal Exhibit B, p. 1-2) of 20 utilities shows 18 out of 20 states either permit a customer to replace a smart meter with an analog meter or retain his/her analog meter.[14] Mr. Bauer's analysis of Mr. Goldman's utilities was somewhat different in that Mr. Bauer states that some of the utilities he mentions offer either digital or analog meters as a choice for someone who didn't' want a smart meter (Bauer Rebuttal Testimony, p. 8 lines 5-20). However, Mr. Bauer's chart is incomplete as he admitted on cross-examination that, for the utilities offering replacements for a smart meter, he did not call the utilities to find out if they were offering analog or digital replacements (hence his chart says the opt out is "digital or analog"), and he admitted they would certainly know what they were offering (Transcript p. 72 line 7 to p. 73 line 3). Mr. Goldman was available for cross-examination, but not cross-examined (other than his signature on a petition), which IPL could have done if IPL thought it could show any discrepancies in Mr. Goldman's list of utilities offering analogs at any time. His list is accurate, leading to the conclusion that if IPL does not allow analog meters *whenever a customer desires them*, IPL will be among a minority of utilities who take that position. IPL has not met its burden of proof to show that the analogs cannot be used because of their unavailability or inaccuracy.

[14] In the bottom two rectangular boxes on page 1 of Goldman Rebuttal Exhibit B, see that nine utilities in the next to last rectangular box (beginning with California Electric and Gas) permit *replacing* a smart meter with an analog meter (e.g., if the customer has a smart meter and later changes his mind, he/she can get an analog meter), and another nine utilities permit the customer to keep his/her analog meter and will replace a smart meter with a digital meter (last rectangular box on p. 1 of Rebuttal Exhibit B).

VI. Most of the Opt Out Eligibility Conditions and Criteria to Retain an Opt Out Meter are Unreasonable

A. The Conditions to Obtain and Retain an Opt Out Meter and the Costs Must be Reasonable

The standard for the Board to make its decision on these issues is whether the conditions are reasonable. Mr. Bauer agreed that reasonableness was the test (Transcript, p. 86 line 24 to p. 87 line 6) and the Joint Statement of Issues filed by the parties on October 12, 2018, p. 2 shows the parties agreed that one issue before the Board was "Are IPL's NSMA eligibility criteria and conditions for retaining a NSMA meter reasonable?"

1. Most of IPL's Conditions and Criteria are not Reasonable

As an eligibility criterion, Intervenors agree with the OCA and IPL that the customer of record who is responsible to IPL for payment should make the opt out choice, but (as stated below), if the customer of record changes the new customer of record should have an opt out choice. The other eligibility criteria (opt out meter available only for residential service, smart meter is required if other than a single meter at the point of delivery, opt out meters not available for renewables or cogeneration etc.) are not reasonable, nor are the conditions for retaining an opt out meter reasonable. The eligibility conditions and criteria for retaining an opt out meter should be evaluated in light of IPL's stated objective to get rid of the opt outs and end the customers' choice. Mr. Vognsen's Direct Testimony, p. 14 line 19 to p.15 line 5, contains the following:

> Q. What if the customer is no longer the customer of record?
>
> A. IPL intends for NSMA to be a limited-availability program, available to an existing customer at a particular location. By design it is meant to sunset. If the customer is no longer the customer of record, IPL would install an AMI meter. This balances providing a reasonable alternative to existing customers with not indefinitely maintaining and managing non-standard meters.

> The limited-availability nature of the program is also one of the reasons why under our proposed tariff, once an AMI meter is installed it will not be replaced by a non-AMI meter.

This is not a customer-friendly or reasonable perspective. An opt out program that is designed to sunset does little more than pay lip service to the customers' choice.

a. The Customer of Record Condition is Especially Onerous, and Endangers the Preservation of the Fairfield/Vedic City and Maharishi University Culture

The testimony of Intervenors and their witnesses, as well as the comments in the docket of many Fairfielders, including Dr. John Hagelin and William Goldstein, the president and general counsel of Maharishi University of Management, respectively, show that the customer of record condition is likely to have a very damaging effect on the Fairfield community and the continuation of its special culture. William Goldstein, general counsel of MUM, stated in his comment filed in the docket December 26, 2018, that:

> As I understand the [customer of record] proposal, if someone purchases a home or leases a residence in Fairfield or Maharishi Vedic City, that new owner or lessee would not be permitted to have any meter other than a radiating smart meter even if the home previously had an opt out meter. In addition, if an owner or renter moves within Fairfield or Vedic City or any place in Alliant's area, he/she would also not be permitted to have any meter other than a smart meter. This is troublesome since as you probably know by now, much of the population in this area, and certainly those in the University community, do not want smart meters and people move all the time.
>
> A smart meter requirement will immediately decrease the attractiveness of the University to faculty, staff and students; decrease the University's donor base (new residents in the area who support the University can provide necessary donations); and decrease the attraction of Fairfield to those individuals who are drawn to this community for its unique values. The adverse effect is not entirely predictable but, in all candor, could be extremely harmful to our community. This is our biggest concern with the limited opt out conditions proposed by Alliant.

Mr. Goldman's Rebuttal Testimony, Exhibit B, shows that of the 20 utilities he evaluated, 19 do not require a customer moving to a new location, or a new customer within the utility's territory, to have a smart meter, and the 20th website also appears not to have this

onerous condition although it is a little less certain. This is shown in Goldman Rebuttal Exhibit B, p. 1, in the information in the bottom two rectangular boxes. The opt out provisions of those 18 utilities listed in those rectangular boxes are summarized in Mr. Goldman's chart where he states that they "will replace" smart meters with an opt out meter. Obviously, if a utility "will replace" a smart meter, it does not have restrictions that require a smart meter to permanently be the meter of record for a particular property when the customer of record changes. These are the results then for 18 of the 20 utilities, and the details on the remaining two of the utilities Mr. Goldman surveyed are in the footnote below.[15]

Mr. Bauer's chart of opt out conditions in other states is Exhibit B to his Direct Testimony. Mr. Bauer's chart shows that 25 utilities offer opt out meters (25 out of the 27 in his chart). None of these are described as *not* allowing an opt out meter to a new customer or one who relocates, however, Mr. Bauer may simply have ignored that issue in preparing his chart.

To summarize the available data from other utilities that was submitted to the Board, if IPL is permitted to take away a customer's opt out meter if he/she moves, or if IPL denies any opt out meter to a new customer, Iowa will be unique among the known utilities to have such a condition approved.

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[15] The rectangular boxes omitted the information from the two New York utilities, and they are summarized in Goldman Rebuttal Exhibit B, p.8. For PSEG in Long Island, it states that customers may opt out without charge but "if replacing [a smart meter] then then non-smart meter is a digital meter." Again, if you can replace a smart meter, unlike IPL's proposal where you cannot, that makes 19 of the 20 utilities where a change in the customer of record does not result in a smart meter being forced on the customer. The 20th utility also likely does not have conditions where an opt out is lost to someone who moves or a new owner. The 20th utility is National Grid Gas Co. and that utility simply stated that the customer "may opt out of automatic meter read" and pays a one-time fee to install a non-automatic read meter. This description strongly suggests that the opt out for that utility is not limited to those where there has been no change in the customer of record.

Moreover, IPL has not given any legitimate reason for needing the customer of record condition. IPL argues that there are practical implications if a customer is allowed to keep his non-standard meter, those being "the costs of replacing the non-standard meter at the customer's former premise . . . as well as install a non-standard meter in place of the AMI meter at the customer's new premises" (Vognsen Rebuttal Testimony, p. 16 lines 20-22). Mr. Vognesen estimates the cost to be $56.00 and states that "[a]lthough the OCA does not object to charging customers for the move, a $56.00 one-time move fee may be unacceptable to these customers and, therefore, it has not been offered." (Vognsen Rebuttal Testimony, p. 17 lines 2-5). This is not a valid reason for denying the customer a right to retain a non-standard meter (or denying a new customer a non-standard meter), and it appears to be the only reason advanced by IPL for this criteria other than its desire to sunset all opt outs and require everyone to have a smart meter. Of course, the solution to Mr. Vognesen's uncertainty as to whether the customer may find the fee unacceptable is to ask the customer and give him/her the option to pay the move fee or live with a smart meter. That would avoid the distress that will otherwise result to those who want to keep their opt out meters and help avoid damaging the Fairfield/Vedic City and MUM communities.

Mr. Turner of the OCA testified that a customer who moves should not lose his right to a non-standard meter. He says the customer can take his meter from his old premises (or he should be able to leave it for a new owner or renter) and be responsible for the cost of changing the meters (Turner Direct Testimony, p. 6 lines 6-10). His overall point is that "although IPL might consider it inconvenient, it is not burdensome to IPL to provide some customers a non-standard meter if they prefer one" (Turner Direct Testimony, p. 6 lines 12-14).

b. IPL's Requirement that Customers Opting Out Self-Read their Meters is Unreasonable

IPL's Hearing Exhibit 218 now offers that IPL will read the meters every third month (eight times per year) and send estimated bills the other months (estimated bills for two months, followed by an IPL meter read). Ms. Leyden-Van Gundy testified that if IPL's proposal to have IPL read the meters for those opting out, IPL "would do that" and her understanding was "that is a firm offer" (Transcript, p. 680 line 8 to p. 681 line 10). Eliminating the requirement that customers read their own meters is important to customers, and Intervenors' appreciate the change, which will avoid mishaps to elderly people from reading their own meters and defaults that would impose smart meters on those who don't want them. See Goldman Direct Testimony, p. 15 lines 1-14. However, Exhibit 218 reserved to IPL the right to change the costs and even increase them above $15 per month. For many people, the cost of the opt out program is not affordable, and the higher the cost, the more IPL achieves its stated objective of "sunsetting" the opt outs. As a result, it will be a hardship to many if IPL eliminates the requirement that customers read their own meters, but takes that opportunity to increase the opt out costs even further to advance its objective.

To avoid increased costs, or even to reduce them, Intervenors suggest that those who consent to longer estimated bills (customers can consent to more than three consecutive months of estimated bills under 199 IAC 20.6(3)) should have the option to have actual meter reads only *once or twice* a year and get estimated bills the remainder of the time. And everyone can get estimated bills for three months or even four months with their consent, and have meters reads as few times as possible per year.

c. The Restriction that Opt Out Meters are for Residential Service Only is Unreasonable

Mr. Vognsen states that IPL's tariff is only for residential customers using electric and gas service for general household purposes in space occupied for living quarters (Vognsen Direct Testimony p. 8 line to p. 9 line 3). The only reasons stated are that:

> Commercial and industrial customers typically have more complex configurations and may be billed for both kilowatt (KW) and kilovar (kVar) demands in addition to kilowatt hours (kWh). A non-standard meter will not provide the usage necessary to facilitate billing of those commercial and industrial tariffs, all of which require interval data.
>
> In addition, the meter may require instrument transformers (current transformers and potential transformers)—developing a uniform non-standard meter charge in a tariff would be difficult for non-residential customers.

First, not all commercial and industrial customers are alike, and some, if not many, commercial customers will *not* have significantly more complex configurations or need kilovar readings (IPL says only that commercial customers will "typically" have more complex configurations). Kilovar readings (where there is more consumption than usual for a residence in a given hour due to heavy machinery and the like) are not universally needed by all commercial customers, and for those where kilovar readings are needed, IPL has not met its burden of proof to show that analog or digital meters cannot provide kilovar readings. Intervenors contend there are so many digital and analog meters on the market, including those that read kilovar consumption, that customers can be accommodated if they want to opt out and are willing to pay the cost, for example, of placing a kilovar meter adjacent to a meter reading kilowatts. Iowa should be accommodating in this way to the commercial customers who help maintain and grow its economy. It must be the case that IPL has been reading commercial and industrial kilovar usage for years without smart meters so how could this be a reasonable requirement.

Intervenors have a special concern for learning institutions, hospitals, day care and senior citizen centers where there may be especially vulnerable populations. MUM for example, has 45 buildings (Intervenors' Hearing Exhibit 63, p.1), most of which are class rooms and

administrative offices, which would not seem to have the kind of machinery that would even need kilovar readings.

And if the meter reading is complex for commercial users who want to opt out, that issue is now moot since IPL will do the readings and can do them just as they have for many years before smart meters.

d. The Time- of-Use and Similar Restrictions are Unreasonable

Mr. Vognsen explains that a time-of-use meter has multiple data registers and "because of the multiple reads that would be required it would be difficult for the typical customer to distinguish between the various data displays of the time-of-use meter" (Vognsen Direct Testimony, p. 10 lines 18-22), which he contrasts with the new AMI meters which will do away "with the need for the meters to have various usage displays" (Vognsen Direct Testimony, p. 10 line 23 to p. 11 line 24).

Mr. Vognsen acknowledges that non-smart time-of-use meters are available (they just have various usage displays), and, again, IPL has not met its burden of proof to show analog meters cannot fulfill the function (or sometimes two analogs) of measuring peak and off peak usage. Intervenors again contend that there are so many different analog and digital meters on the market that smart meters are not needed for time-of-use readings. Mr. Vognsen's only other argument against non-standard meters for time-of-use billing is the need to reimpose a $3.35 monthly time-of-use meter charge (Vognsen Direct Testimony, p. 11 lines 4-14), but if that charge is appropriate, it can be reinstated for those who believe such meters may decrease their overall billing.

e. Solar and Other Distributed Energy Sources Should Have Opt Out Rights, including the right to Analog Meters

Iowa Code Section 476.21 states:

476.21 Discrimination prohibited.

> A municipality, corporation or cooperative association providing electrical or gas service shall not consider the use of renewable energy sources by a customer as a basis for establishing discriminatory rates or charges for any service or commodity sold to the customer or discontinue services *or subject the customer to any other prejudice or disadvantage based on the customer's use or intended use of renewable energy sources.* As used in this section, "renewable energy sources" includes but is not limited to, solar heating, wind power and the conversion of urban and agricultural organic wastes into methane gas and liquid fuels. (Italics added).

The Iowa Code clearly prohibits *any prejudice or disadvantage,* and offering an opt out of one kind to customers other than solar or other renewable users is a clear prejudice or disadvantage to them compared to a similar residential customer without a renewable source. IPL argues (Vognesen Rebuttal Testimony, p. 13 line 15 to p. 14 line 13) that the Iowa Code mirrors 18 CFR 292.305(a)(1) and that the Iowa Code must be viewed in light of 18 CFR 292.305(a)(2), which recognizes that

> Rates for sales which are based on accurate data and consistent system-wide costing principles shall not be considered to discriminate against any qualifying facility to the extent such rates apply to the utility's other customers with similar load or other cost-related characteristics.

First, 18 CFR 292.305 (a)(2) was not enacted into law in Iowa and Iowa certainly could have done so. Iowa law says a utility cannot discriminate in any way including in setting rates, period. Therefore, the federal regulation does not modify the Iowa law. Moreover, that federal regulation, even if it did apply, only deals with what is not rate discrimination and IPL's tariff simply states that a renewable producer cannot opt out.

IPL next argues that

> All customers that operate generation in parallel with the utility grid must comply with the utility's interconnection *requirements* . . . . More specifically, the Level 1 Interconnection Request Application Form and *Distributed Generation Agreement*, provides (Attachment 1, paragraph 5) that "Any required metering

> shall be installed pursuant to *the utility's metering rules* filed with the Iowa Utilities Board under sub rule 199 IAC 20.2(5). In addition, customers who elect to net meter are also subject to the provision of the IPL's *net metering tariff* in regards to the metering, see Rate Code AEP, tariff sheet nos. 53 and 54. (Italics added).

In this argument, IPL ignores the Iowa Code and its elevated status as compared to the four things it mentions: the *utility's requirements, agreements, metering rules*, and *tariffs*. The requirements, agreements, metering rules, and tariffs simply can't trump the Iowa Code and permit IPL to discriminate.[16] Moreover, IPL's own actions show there is no impediment to providing an opt out meter in any of IPL's requirements, agreements, metering rules, and net metering tariff. IPL's Exhibit 224, p. 1, shows that at this time most of the solar generators have digital meters (therefore, how could non-smart digital meters not be permitted), and two have analog meters (Stephen Collins and Jobeth Lewer). IPL also uses this Exhibit in an effort to show that solar users are satisfied with digital meters so they don't really want or need analogs. Ms. Kelly, however, addressed this point when questioned at the hearing and describing the evolution in the knowledge in the Fairfield community about dirty electricity (Transcript, p. 943 lines 18-20 and p. 944 lines 5-17).

In his Rebuttal Testimony, Mr. Vognsen states that only 13 of 67 solar owners in Fairfield have opted out (Vognsen Rebuttal Testimony, p. 12 lines 21-24), but now, IPL's Exhibit 223 shows that 38 accounts have opted out, and Emily Kelly's filing in the docket on

[16] IPL for example may have entered into agreements dictating that IPL would determine the kind of interconnection for solar users. That is simply unenforceable and unconscionable in the face of the Iowa anti-discrimination statute and in the absence of a safety requirement. See *C & J Fertilizer, Inc. v. Allied Mut. Ins. Co.*, 227 N.W.2d 169 (Iowa, 1975) setting forth the law relating to contracts between consumers who have no choices and powerful parties, including monopolies. At 180, the Court states that "[t]he situation before us plainly justifies application of the unconscionability doctrine: 'Standardized contracts such as insurance policies, drafted by powerful commercial units and put before individuals on the 'accept this or get nothing' basis, are carefully scrutinized by the courts for the purpose of avoiding enforcement of 'unconscionable' clauses.'

December 18, 2018 shows that 54 of the 67 solar owners in Fairfield/Vedic City have petitioned, saying they want analog meters (see also Transcript p. 916, lines 16-25).

In addition, Mr.Vognsen states that

> Many of these customers are on IPL's net metering tariff and, among other reasons for owning their own solar panels, [the customers] are interested in receiving the financial benefits afforded to them by receiving credit for excess generation through net metering tariffs at above market rates. *To continue to receive this credit requires these customers to accept an AMI meter, which is necessary to measure and calculate their credits.* (Italics added).

(Vognesen Rebuttal Testimony, p.13, lines 5-11). Mr. Vognsen's argument is circular. A solar producer only needs a smart meter to get his/her production credits if the condition prohibiting solar users from opting out is imposed by the Board. But if the condition is not imposed by the Board, solar users can get their production credits, just as they are now getting paid for their delivery of power and as they have been for years (Intervenors Exhibit 64 is Emily Kelly's IPL bill showing her credit for energy delivered to IPL). Credits for power delivered by the solar users do not require smart meters.

Moreover, technologically, analogs can be made available to distributed energy generators. Mr. Bauer agreed at the hearing that if "two analogs are put on a residence . . . .that has a solar system, they would not have to have a smart meter." (Transcript, p. 91 line 24 to p. 92 line 2).

Those solar customers signing the petition also state that their "opt-out should allow solar and wind users to continue to sell and receive back their excess energy to Alliant at the rate they originally contracted for, with no reduction in compensation" (IPL Exhibit 223). The Iowa anti-discrimination statute cited above also applies to rates. As a result, if other solar and wind users

in Iowa will be paid rates for the energy delivered to IPL through their net metering structure, the opt out customers, whether they have analog or digital metes, need to be paid at those same rates.

2. The Opt Out Costs Should be Eliminated or Reduced and Should be Appropriately Reduced to Reflect the Actual Costs for Customers where there is a High Concentration of Persons Opting Out

a. The Proposed $15.00 Per Month Cost is Unreasonable

Intervenors agree with the OCA and with those filing complaints in the docket that the proposed cost of $15.00 per month for those opting out is unreasonable, that customer service representatives who can disconnect and reconnect are not necessary for meter reading, and that where the residences of the opt out customers are concentrated within one area, the costs can be less.

b. *IPL Should Not Charge any Opt Out Fees*

Those filing complaints in the docket do not want to pay any cost for a program they don't want, one they consider an unhealthy, unsafe and punitive program, and one susceptible to hacking and privacy issues.[17] IPL argues that the AMI smart meter is now the standard meter and those not wanting it need to pay the incremental cost. But it is the standard meter because it is the meter to be installed for customers by default, who were not told they would have increased bills as a result of the smart meter program (see Sections VIII and IX of this Brief)

[17] Chester Sullivan of Marion filed his complaint December 7, 2018. He states:

> We allowed Alliant Energy to replace our analog meter with a smart meter because of the fee Alliant would charge us to keep the analog meter. . . .The information transmitted by the smart meter would allow the criminal-minded to deduce extended periods of inactivity at a residence. Who is responsible when this information is used to target homes for break-ins? We want to go back to the analog meter to ensure some basic privacy. Given the misinformation from Alliant about the smart meters, it seems unethical to charge customers who, once educated, now want the safety and security of an analog.

unless they affirmatively opted out and agreed to pay what was estimated to be a $15.00 charge per month for each meter (possibly $15-$25 per month per meter). IPL knows most customers are in the dark about smart meters, so with smart meters being the default meter (i.e., if the customer does nothing he gets a new smart meter), and with a proposed charge for those who elect not to have a smart meter, and because of the lack of disclosures in the notices and brochures (see Section IX), it was guaranteed that relatively few would opt out and smart meters would be installed and become "standard."

As concerned as customers are about costs, even told that their costs *might* increase, many would not be interested in the smart meter program, but customers never received this information. Mr. Vognsen stated that "Sending a correct price signal is a fundamental ratemaking principle in having cost-based rates. When IPL incurs additional costs, its price should increase to reflect that cost." (Vognesen Rebuttal Testimony, p. 6 lines 5-7). IPL wants that signal to apply to customers who may want to opt out, but it should also apply to those who may want to evaluate the whole smart meter program based on costs.

If it goes forward, the smart meter program will be paid for by increased billings to customers (see Section VIII). And customers who don't want the smart meter program will be charged more in their future billings for what others are getting in the way of somewhat faster outage responses and remote connections and disconnections. As a result, either everyone should share in the cost of the opt out program (and the opt outs are not charged), or the opt outs are credited for the increased billings occasioned by the smart meter program against any monthly tariff for the opt outs. That is more fair.

Ideally, however, there should not be a "standard" meter for purposes of billing. If there are 2,000 opt out customers and an aggregate of approximately 3,000 opt out meters, at $15 per

meter that results in fees to IPL of 3,000 times $15 or $45,000 per month. If that cost was spread over IPL's approximately 700,000 gas and electric meters, it amounts to a charge of only 6.4 cents per meter per month ($45,000 divided by 700,000). This would not be "preferential treatment" to those opting out as Mr. Vognsen maintains (Vognsen Rebuttal Testimony, p. 6 lines 10-15). It would prevent discrimination against customers who don't want smart meters with their uncertainties and costs. It acknowledges that there is no "one size fits all" meter to be imposed on everyone, irrespective of their desires, electromagnetic sensitivities, and economic status.

c. If there will be a Smart Meter Program with Opt Out Fees, those in Fairfield/Vedic City should have Reduced Fees Commensurate with their Reduced Meter Reading Charges

The basic principle in charging for special services was stated by Mr. Vognsen as follows:

> Q. Who should bear the costs when a customer requests services and facilities beyond what is normally provided?
>
> A. As a general rate design principle, the cost causer should pay for the cost they cause the Company to incur. It is also for this reason that IPL develops pricing to reflect the costs to provide service. All customers should pay their fair share of costs. When prices are not based on the costs to provide service, it causes economic inefficiency resulting in other customers subsidizing the cost being incurred due to the cost causer.

(Vognsen Direct Testimony, p. 3 line 19 to p. 4 line 3). According to this long standing principle of customers paying only their fair share of costs, those in the Fairfield/Vedic City area should not pay the same charge for opting out as those in other areas where the population of opt outs is not so concentrated. Mr. Vognsen agreed that this principle should apply to reduce the opt out costs for those in an area where there was a high concentration of persons electing to opt out. In

response to a question from Mr. Marcus on whether these costs should be reduced if there were a very substantial number of people in Fairfield/Jefferson County, Mr. Vognsen stated:

> Yeah. I testified our purpose is only to collect the costs that they cause us to incur. So if you have a higher concentration of customers in a particular area and you know that may offset, you know, customers that are more dispersed geographically--so we only want to recover whatever those actual costs are in the charge.

(Transcript, p. 262 lines 12-18). Mr. Vognesen concluded by saying that if there was a high concentration of opt outs in one population area, IPL would adjust the cost in the next rate case (Transcript, p. 262 lines 19-24). [18] But it can't be that the customers in a high concentration area merely reduce the overall costs for everyone. That violates the fair share principle and the idea that the distance in charging for special services is taken into account.

Fairfield/Vedic City has a high concentration of opt outs in the area. In the Leyden-Van Gundy Rebuttal Testimony, p. 2 line 5 (chart), she states, as of October 8, 2018 when her testimony was filed, that 923 electric and 769 gas meters in the Fairfield/Vedic City area are on the "hold list" (and the number is significantly higher now)[19], a total of 1,692 meters; and the

[18] Reducing the cost for those in an area with a high concentration of opt outs is appropriate, but IPL should take into account that adjusting only in the next rate case may not be soon enough if people are discouraged from opting out by an opt out rate that is too high. The opt outs would seem to need the actual rate in advance of opting out.

[19] Since October 8, 2018 new opt outs were submitted by Ms. Kelly in her petitions, as well as those from Maharishi University mentioned by Dr. Hagelin (Intervenors' Exhibit 63) in his early Decmber letter, and MUM's general counsel William Goldstein in his objection filed in the docket December 26, 2018

total number of opt out meters is 2,921 meters (Intervenors' Exhibit 49, p, 2, 4th Supplemental Response). Transportation and related costs involved in meter reading is the principal opt out cost, and since 58% of the opt out meters will be read from the one locale, the actual costs to those opting out from Fairfield/Vedic City should be substantially less than those in other locations. How much less?

IPL's $15.00 monthly charge includes $12.59 for the "Manual Verification Read" (Vognsen Direct Testimony, p. 15 line 20). That is the incremental cost "associated with dispatching a customer field representative to perform a verification read of the meter twice per year" under the prior IPL proposal, and the cost "includes the incremental labor costs of the field representative and vehicle costs" (Vognsen Direct Testimony, p.16 lines 13-16). Mr. Vognsen stated "[t]his activity is estimated to require an average of one to one and a half hours per read" (which includes travel time) (Vognsen Direct Testimony, p.16 lines 16-18). However, Ms. Leyden-Van Gundy said that a meter reader would 500 meters a day on average (Transcript, p. 785 line 8-11), which would be when the population whose meters need to be read are in close proximity.

Using Mr. Vognsen's estimate (one to one and a half hours per meter read) and taking an average of 1 and 1/4 hours per meter to read it based on Mr. Vognsen's estimate, that means his $12.59 monthly cost estimate was based on about six meter reads per day. However, in Fairfield/Vedic City because of the close proximity of the persons opting out, perhaps 100 meters can be read a day (this is based on decreasing Ms. Leyden-Van Gundy's number of 500 since those opting out won't be in quite the same proximity as when everyone's meter is read). That is 16 times more. So if this analysis is correct, we divide $12.59 per month by 16, and as a

rough measure we get a cost of about $.79 as the true cost that those in Fairfield/Vedic City should pay per month for the manual read verifications if there were two reads per year.

d. Combination Customers with Electric and Gas Meters who Elect to Opt Out should only pay Half of the Manual Verification Read Cost for Each Meter

By virtue of IPL's proposal in its Exhibit 218, we don't know what it will propose for the present $12.59 monthly cost for the Manual Verification Read (labor and travel costs to read meters periodically for those who opt out). But if the cost for an opt out customer who has just one meter is $12.59, because the same meter reader will read both the gas and electric meters in one trip, to honor IPL's important cost allocation principle and prevent combination customers from paying more than their fair share and subsidizing other IPL customers, the cost for the manual verification for a combination customer should be half of the assumed $12.59 monthly charge or $6.30 per month per meter. This is entirely fair. IPL would fully recoup its $12.59 from the meter reader's trip, regardless of whether he/she reads one meter or two. Under these circumstances, charging the customer $12.59 per meter, while it furthers IPL's objective of sunsetting the opt outs, is egregiously unfair to these combination customers. IPL's argument that electric customers are separate from gas customers and that it can't discriminate or give a discount to a combination customer (Transcript, p. 283 line 2 to 284 line 3) is a convoluted argument that ignores reality and basic fairness. The opt out costs are special costs that are supposed to be based on actual costs and only charging a customer for his fair share. Cutting the travel and meter reading costs in half for the combination customers is the only approach that allows IPL to have cost-based rates that are fair to the opt out customers.

VII. The Meters and Home Office can be Hacked and Privacy Can be Lost, which Offsets the Benefits of Shorter Outage times and Remote Disconnections

Dr. Schoechle has been an engineer for more than 40 years and for 10 years and taught at both the graduate and undergraduate level at Colorado State University. He was involved during the early 1990s in the engineering development and standardization of remote metering that became ANSI C.12, presently known as *Advanced Metering Infrastructure* (AMI) (Schoechle Rebuttal Testimony, pp. 2-3). He testified to the significant privacy issues and contradicts Mr. Reed's testimony that "the total household electricity consumption [from the Sensus meters] . . . produces a usage signature that can reveal a great deal about the appliances, the habits, the lifestyle and other details about the inhabitants" (Schoechle Rebuttal Testimony, p. 12 lines 8-11) and "short interval data can easily establish load signatures that identify individual appliances and even the manufacturers . . . ." (Schoechle Rebuttal Testimony, p. 12 lines 21 -24). In response to the Board's questions he said it is worse if the data is collected frequently, but even if IPL agrees not to sell the data it has no control over where it goes once it is collected (Transcript, p. 824 line 13 to p. 825 line 10).

Dr. Schoechle also stated that "because of the meter's remote disconnect and its remote software upgrade capability, such features could represent a major meter operating system vulnerability, with serious consequences (see Exhibit F (confidential) (Schoechle Rebuttal Testimony, p.16 lines 2-5). Mr. Bauer agreed with the consequences. He said:

> Q. So if they got into the head end system it's possible somebody could remotely disconnect meters do whatever a meter could do with respect to the house; is that correct?
>
> A. Yes.

(Transcript, p. 434 lines 17-21). IPL gave the same response as to the potentially serious consequences, but with details that are confidential, in an interrogatory response (Schoechle Rebuttal Confidential Exhibit F).

Dr. Schoechle's Supplemental Rebuttal Testimony also described a recent *Wall Street Journal* article on a hacking of confidential information at Pacific Gas & Electric. He said:

> PG&E, for example, lost a confidential database to hackers. If a hacker gained control of such a database from the utility, it could tell the hacker how to remotely disconnect customers. If a large number of customers were to be disconnected in a short period of time, it could destabilize and possibly shut down the grid. Such a design is unsound and unnecessarily exposes the grid and its users to either malicious action or a "normal accident."

Dr. Schoechle also said the meters are easier to hack into than the head end system because the meters are inexpensive (Transcript, p. 826 lines 5-12). Dr. Schoechle said there are many experienced people who could hack into a meter, but that hacking into the database would have even more consequences (Transcript p., 826 line 4 to p. 827 line 2). In response to Board questions, Dr. Schoechle agreed that utilities with customer information are not inherently safer than any other system by which a party is storing customer information (Transcript, p. 831 line 21 to p.832 line 25). He also said that a utility with a licensed band width (like Sensus) has a part of its system that is easier to hack because you can isolate the signal. With a mesh network used by other AMI licenses, it is "a nightmare because there's so much data traffic, but in this case you could isolate it easily" (Transcript, p. 827 lines 3-19). Dr. Schoechle didn't personally know of a specific example of hacking over a licensed bandwidth (Transcript, p. 833 lines 21-24).

Mr. Reed's testimony that it is not possible for the Sensus meters to be hacked is not plausible. He said:

> Q. Is it possible for the computer or for the meter to be hacked by some kind of an external source, such as a ham radio or some other source?
> A. No.
> Q. How is that prevented?
> A. It is--the radio--there are multiple layers, is the answer.

(Transcript, p. 346 lines 10-19). Sensus has many reasons for taking an extreme position (those being the dollars it is being paid for its meters) contrary to the experience of PG& E and countless other major corporations.

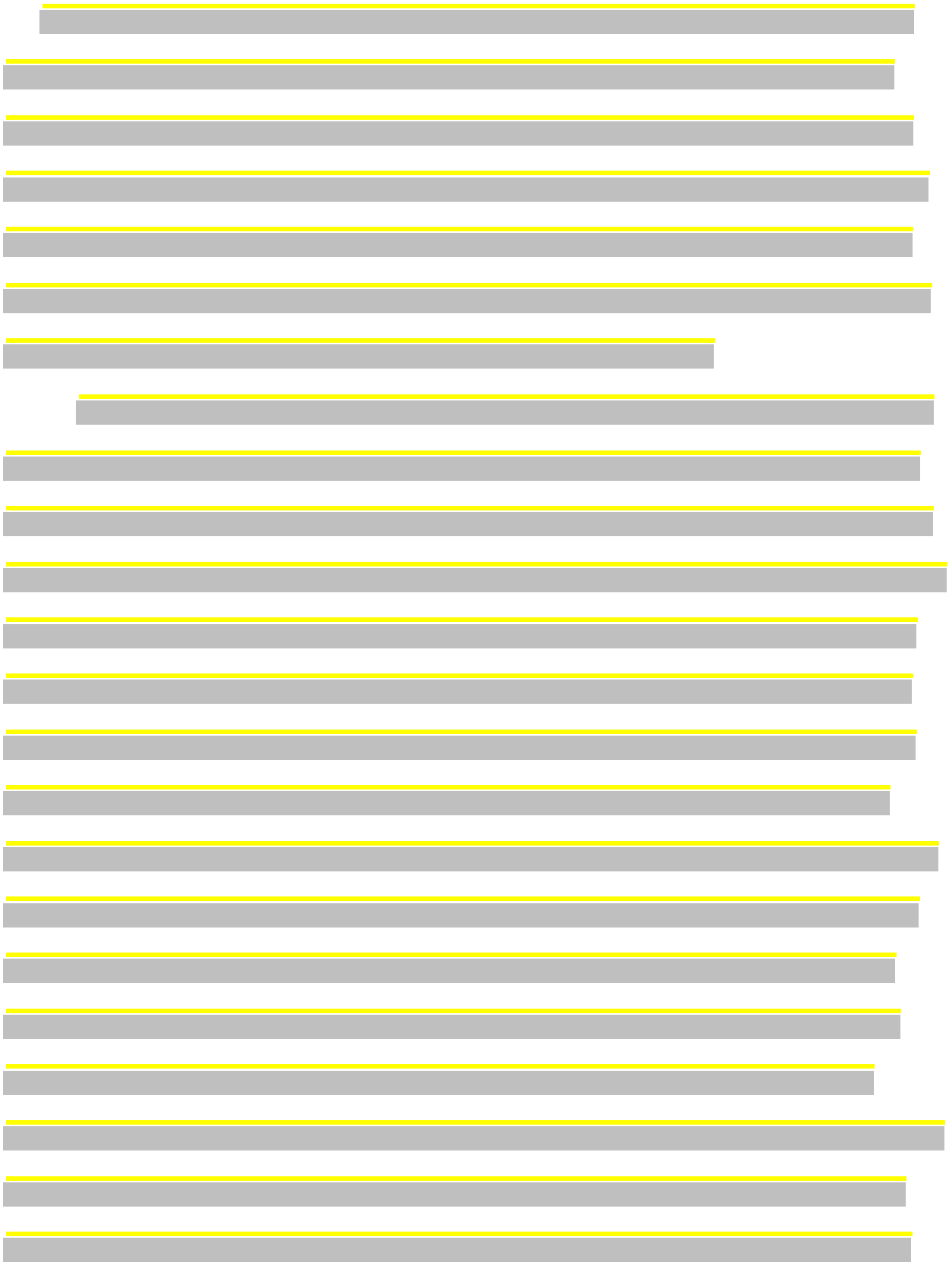
Fortunately, there are many companies that can do cybersecurity risk assessments to determine the security of the meters and head end, and Intervenors believe a credible third party assessment would be appropriate. Mr. Bauer said he did not know of any third party audit that has been conducted (Transcript p. 431 line 16 to p. 432 line 11). The consequences of a hacking (unwanted outages that can't be quickly remedied) are too great and more than outweigh (a) the ability to more quickly remedy naturally occurring outages, and (b) the ability of IPL to remotely connect and disconnect a meter. Mr. Reed's testimony that hacking is not possible should not be blindly accepted in light of Dr. Schoechle's testimony and in light of a manufacturer's natural inclination to be positive about its products. Mr. also Reed relied on the FCC application for certification of the Sensus meters, and he read an FCC label purportedly showing certification of the device, when Sensus and presumably Mr. Reed knew the terms of its grant authorization.

VIII. Customer bills will Increase to Pay for IPL's AMI Smart Meter program

In response to an interrogatory asking the effect of the smart meter program on customer bills over the next two years, IPL stated that customer bill impacts for future rate cases cannot be determined at this time (Lipman Rebuttal Exhibit A, p. 13). Maybe it can't precisely be determined, but IPL seems to know customer rates will increase. Mr. Vognsen stated "IPL will seek approval in a rate case to commence recovery of its investment in AMI meters. Until IPL files a rate case, customer rates reflect the recovery of costs associated from a historic test year of a prior rate case" (Vognsen Rebuttal Testimony, p. 2 lines 8-11). And in response to a Lipman interrogatory, IPL stated the following (Lipman Rebuttal Testimony, Exhibit A, p.6): "All of

IPL's Iowa electric retain and natural gas customers will pay for the costs and receive the benefits associated with its smart meter program and infrastructure. IPL will begin recovering costs consistent with a rate case."

IPL wouldn't be commencing a rate case to include the smart meter costs if it didn't believe it was entitled to recover costs from customers or if the cash benefits to customers exceeded the costs. Ms. Leyden-Van Gundy admitted that IPL "wouldn't be going for a rate hearing if [it] weren't going to ask for a cost increase" (Transcript, p. 717 lines 15-18). If there is a smart meter program, the customers will have to pay the costs, which is why Mr. Vognesen also said IPL "will begin recovering costs consistent with a rate case," as stated above.



[redacted]

IX. The Customer Notices and Brochures about the AMI program were Deficient

[redacted]

Schedule A to Ms. Leyden-Van Gundy's Direct Testimony is a billing insert that was sent by IPL to all customers in IPL's August, 2018 bills (Transcript, p. 698 lines 1- 18). IPL's brochure that is Intervenors' Exhibit 41 is a December, 2017 brochure that was sent by IPL to those who want to opt out or who call inquiring about the new program (Transcript, p. 694 line 20 to p. 695 line 23). The other IPL brochure reviewed with Ms. Leyden-Van Gundy is Schedule B to her Direct Testimony. The notices and brochures are flawed solicitations to participate in the smart meter program.

1. *The notices to all customers tells them they only can object to the monthly opt out charges and leads them to believe that there are no charges with the smart meters.* The notice to all customers (Leyden-Van Gundy Direct Testimony, Schedule A) advises them that they can file written objection to the "proposed nonstandard meter charge" (the opt out charge), but not to other conditions of the opt out program or objections to the smart meter program as a whole (Leyden-Van Gundy Direct Testimony, Schedule A, p. 2). And the brochures (Exhibit 41, p. 13 and Leyden-Van Gundy Direct Testimony, Schedule B, p. 9) state only that "the [opt out] charges are subject to approval by the Iowa Utilities Board").

Even worse, the notice to all customers (Leyden-Van Gundy Direct Testimony, Schedule A, p. 1) states that "Smart meters are digital meters that automatically transmit meter readings wirelessly at no additional charge." But that is misleading because while there is no special opt out charge, the smart meter program has a charge to it that will be included in higher rates, which is why IPL will be seeking reimbursement from its customers. New notices to customers will be required to prevent a great many Iowans from feeling misled following IPL's rate case. The cost of the program is obviously a material matter.

2. *IPL's customer notice and brochures state the customer cannot opt out if he/she is*

enrolled in time of day, or renewable or alternative production, or is other than a residential customer. As a minimum, IPL should have told the customers that those conditions could be objected to and written objections could be made since if those conditions are not all accepted, the customers relying on IPL's statements and not opting out because, for example, they were renewable producers or commercial customers, should have the right to opt out.

3. *IPL's brochures all state that "smart meters are safe for you and your family"* (see, e.g., Leyden-Van Gundy, Schedule B, p. 3). The safety statement is misleading as it fails to disclose that its Sensus smart meters, or many of them (those with an antenna closer than 20 cm where that condition has been imposed by the FCC in its authorization), are not in compliance with FCC safety standards, and that its Itron digital meters do not have a required compliance certification. Coming within one inch of the antenna is hazardous as previously discussed. IPL makes similar statements that "safety is our #1 priority" and that "smart meters are as safe as older style analog meters" (Schedule B, p. 4). The statement that smart meters are as safe as analog meters has no evidence whatsoever to support it. Analogs do not produce RF radiation or dirty electricity and there is no requirement to maintain a minimum separation distance from the antenna (analogs have no antennas and a child could safely sleep with one next to him). [redacted] The unequivocal statements about safety also ignore thousands of research studies and the scientific controversy about RF radiation.

4. *IPL's notices refuse to tell customers the smart meters emit RF* ***radiation***. In what must be company or industry policy, the brochures and IPL's website never state that the customers will be exposed to "radiation." IPL's website refers to the number of "signals" a day

from the meters (Intervenors' Exhibit 6), and its brochures refer to how often "the signals transmit," and whether they "signal all day," and the "RF energy" given off, and "Radio Frequency levels" (Leyden-Van Gundy, Exhibit B, p. 6). This whitewashes the issue rather than making a full disclosure.

5. *IPL's website and brochures contain erroneous information on the number of pulses per day*. Until its recent November, 2018 brochure, sent after a majority of smart meters have been installed, IPL stated that its meters "will signal six times per day, with each signal lasting 0.15 seconds" (Leyden-Van Gundy, Exhibit B, p. 6). This is undeniably misleading to the larger commercial customers for whom the minimum is 25 times per day, and for everyone it ignores the alarm, buddy, and on-demand messages, as well as the potential for some percentage of customers to experience thousands of signals per week. IPL has not revealed how many persons will live at residences that signal over, for example, 500 times a week or more, especially during the tune-up period (but not exclusively during tune-up as indicated by the Wisconsin data), which may last for several months. IPL also doesn't disclose that during that early period the signals will be in "boost mode" and transmit for 1.2 seconds in duration (Matara Rebuttal Exhibit C Public, p. 153) not 0.15 seconds. Several hundred thousand smart meters have been installed based on this inaccurate information.

6. *The website and brochures contain other erroneous health information.* They refer to "25,000 articles published on the topic [of RF radiation] over the last 30 years" and list five websites on the health effects of "radio frequency" (again never using the word "radiation"), suggesting that these studies show no harm. However, the majority of the studies likely do show harm as indicated in the many studies attached by Dr. Havas in comparison to Dr. Valberg. In addition, the unbalanced presentation of websites containing information on radio frequency

radiation ignores the many websites with contrary information. The brochures and the website even state that the World Health Organization (WHO) has determined that "small amounts of RF energy from smart meters is not harmful to human health" (Exhibit 41, p. 9 and Leyden-Van Gundy Direct Testimony, Schedule B p. 6) when there is absolutely no such finding about *smart meter* radiation by WHO, and what we now know would be most relevant, that being studies on smart meters that violate the 20 cm rule or other FCC safety rules. Moreover, WHO classifies RF radiation as a class B carcinogen (possibly carcinogenic) (Havas Rebuttal Testimony Exhibit LL) so even the WHO believes some radiation can potentially cause cancer.

Intervenors contend that IPL needs to send new notices to all customers making a fair disclosure about the smart meter program and the likely increase in customer rate charges to pay for IPL's smart meter investment.

X. Ruling Requests

1. *20 cm issue*. The Sensus Stratus meter and any other meter with an FCC grant authorization requiring a 20 cm minimum separation distance should be turned off if the antenna is less than 20 cm from the public. This would apply to the Sensus Stratus meter and, if the Sensus iCon meter has an antenna that would be closer than 20 cm to any person, it would apply to the iCon which has that 20 cm limitation (Intervenors' Exhibit 46, p.8), and it would apply to any other Sensus meters not in compliance with the 20 cm separation distance. This is a requested moratorium on the use of these meters until the Board determines that IPL has rectified the problem after notice to the Intervenors and the OCA and an opportunity to be heard.

2. *Non-compliance with Voltage Transient Limits*. The Centron Itron C1S meter (Itron meter) should be turned off since IPL has not met its burden of proof by producing any certification of FCC compliance or independent other safety report, or even an IPL report,

showing that the meter is safe and FCC compliant. Mr. Reed testified that such reports were required. Moreover, the use by IPL of any digital meter (e,g, the Sensus smart meters or the Itron or other digital meters) should be preconditioned by the Board on proof to it of satisfactory third party reports showing that the meters comply with voltage transient limits and have filters within the meters that filter the dirty electricity. Due diligence by IPL in safety issues is required by IAC rules, and obtaining certification reports should be part of any safety program. IAC 199—20.8 (1) states:

> Each utility shall exercise reasonable care to reduce those hazards inherent in connection with its utility service and to which its employees, its customers, and the general public may be subjected and shall adopt and execute a safety program designed to protect the public and fitted to the size and type of its operations.

3. *RF and Voltage Transients*. In light of the mounting evidence of health risks from non-thermal effects of RF radiation, including the highly regarded recent research of the federal government's National Toxicology Program, and the Ramazzini Institute's companion research, Intervenors request a moratorium on the installation, activation, and provisioning of the smart meter program. A moratorium would (a) give the Board an opportunity to determine how scientists and government agencies are reacting to the new research and even allow the Board, if it was so inclined, to retain its own third party reports on this and other safety issues in light of what is believed to be the Board's overall responsibility to safeguard the public interests. During the moratorium period the Board should (b) require IPL to remedy the 20 cm deficiency and obtain the meter certifications as suggested in ruling request 1 and 2, (c) require IPL to have a third party, independent evaluation of the cyber security safety of its smart meter head end and individual meters, with the Board to be deemed a (non-paying) client of the cyber security firm along with IPL, so the Board knows fully any limits on the scope of the evaluation and all

findings and will jointly with IPL receive all reports, and (d) require IPL to notify all customers that the smart meter program will likely result in increased customer billings, and a range of those costs, and give the customers a new opportunity to object to the program. Telling customers that increased costs will result from the smart meter installations is as basic as notifying opt outs of their charges, and would allow the Board to determine who really wants a smart meter or is just not opting out because IPL says the opt outs will incur costs.[21] In view of the health and safety issues, including hacking and privacy, Intervenors do not desire the smart meter program to go forward at this time. However, if smart meters are permitted to be used, Intervenors request a 12-month moratorium or such longer period as the Board, at any time, deems appropriate.

4. *Programming of Meters/Number of RF Transmissions*. Again, Intervenors request that the smart meter program not go forward at this time. However, if smart meters are permitted to be used by IPL, Intervenors request a ruling that all smart meters be programmed to transmit once per month to provide consumption data for billing purposes, with no alarm, on-demand or buddies messaging other than necessary safety alarms. In addition, Intervenors request that billings to all customers contain information on the highest number of transmissions in that billing period, including providing such information on estimated bills, and if there are transmissions in any period that are significantly above the number that is programmed, prompt

[21] A moratorium for health and other reasons is not unprecedented. Several states (Goldman Rebuttal Exhibit B chart), as well as cities and counties impose moratoriums, and see Havas Rebuttal Testimony, p. 23 line 26 to p.24 line 8, and Havas Rebuttal Exhibit MM, p. 2, which refers to a 2012 request for a moratorium on the installation of wireless smart meters of The American Academy of Environmental Medicine, addressed to the California Public Utility Commission. The Commission requested:

> • An immediate moratorium on "smart meter" installation until these serious public health issues are resolved. Continuing with their installation would be extremely irresponsible.
>
> • Provide immediate relief to those requesting it and restore the analog meters.

written notice shall be given to the customer, the OCA, and the Board to alert them to the issue and allow them to monitor its resolution. Providing the requested information to all customers allows a customer who is concerned about RF radiation from neighbors to be able to request information from the neighbor in order to better assess his/her living circumstances. See IAC 199-20.4 (1)(h), which states that the utility shall "[f]urnish such additional information as the customer may reasonably request."

5. *Opt Out Eligibility Criteria and Conditions.* Intervenors request that (a) opt out meters can be analog meters if customers elect them, subject to IPL reasonably determining the kind of analog meter, (b) a customer may determine to opt out at any time to an analog or digital meter, including replacing a smart meter with an opt out meter, (c) IPL shall read the meters for the opt outs as infrequently as reasonable with IPL to show cause why it would not be reasonable to only have three readings a year, (d) there shall be no loss of the opt out meter due to a change in the customer of record, (e) commercial accounts and institutions may obtain analog or digital meters as they determine subject to the meters performing the functions desired by the customers, (f) analog and digital meters shall be permitted with time–of-use charges if the opt out meters can make such measurements as the customer desires, (g) analog and digital meters shall be permitted even if there is no single point of delivery, (h) solar and other power generators shall have the right to select analog or digital meters in place of smart meters, with no discrimination in the price received by the customer for delivery of production to IPL, and (i) the cost for opting out shall be paid by all customers as this is a health issue and there is no one size fits all meter, or at a minimum, the monthly cost for everyone should be reduced by having as many estimated reads as are reasonably possible, and for those in the Fairfield/Vedic City area, the monthly cost should be reduced to reflect the actual costs for meter reading for those in that

community as compared to the cost for meter reading in parts of the state without the same concentration of opt out customers. If the opt out costs, if any, are not determined until the next rate case, IPL should notify customers in a billing that costs have not been determined and advise them that they should opt out and be placed on the hold list, and that if the cost, if any, is too high for them, they can then change their position and will receive a smart meter.

If the Board determines to impose an installation charge or monthly charge to opt out to any meter, there should be exceptions to the charges for those who are electro hypersensitive or have cancer or other disorders (North Carolina requires a waiver of opt out fees for those with a doctor's notarized letter requiring that avoiding smart meters is necessary for the health of the customer [Goldman Rebuttal Exhibit B, p. 9], but a notarized letter seems excessive for physicians).

6. *New notices to customers.* New notices to all customers shall describe the likely costs of the smart meter program itself, and describe in a balanced way the controversy about health issues, advise customers that its meters don't currently comply with safety standards and are being replaced or remedied, as the case may be, advise that the WHO classifies RF radiation as a class 2 carcinogen, that smart meters may be hacked, and that there is a growing interest in the potential adverse effects of electronics, including smart and non-smart digital meters.

Dated: January 4, 2019 Respectfully submitted,

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